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COMPARISON OF READING ACHIEVEMENT OF FIRST-GRADE CHILDREN TAUGHT BY A LINGUISTIC APPROACH AND A BASAL READER APPROACH.
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*READING ACHIEVEMENT, *FIRST GRADE, *BASAL READING, *LINGUISTIC APPROACHES (READING), READING INSTRUCTION, EFFECTIVE TEACHING, ABILITY GROUPING, SEX DIFFERENCES, CHILD DEVELOPMENT, FRIES LINGUISTIC METHOD, SCOTT-FORESMAN BASAL READER, PHILADELPHIA, PENNSYLVANIA, PHILADELPHIA READING TEST (PRT)

THE RELATIVE EFFECTIVENESS OF TWO APPROACHES FOR TEACHING READING TO FIRST-GRADE CHILDREN AT HIGH, AVERAGE, AND LOW ABILITY SCORE LEVELS WAS INVESTIGATED, AND THE VARIABLES THAT DIFFERENTIATED BETWEEN HIGH AND LOW ACHIEVERS UNDER BOTH APPROACHES WERE COMPARED. THE TWO APPROACHES WERE--(1) THE FRIES LINGUISTIC METHOD, AND (2) THE SCOTT, FORESMAN BASAL READER METHOD. TWELVE CLASSES IN EACH TREATMENT, 4 WITHIN EACH TREATMENT AT EACH OF THE 3 ABILITY SCORE LEVELS WERE INVOLVED IN THE STUDY (A TOTAL OF ABOUT 670 PUPILS). A NUMBER OF PRETESTS WERE ADMINISTERED TO ALL SUBJECTS, AND AFTER A 140-DAY INSTRUCTIONAL PERIOD, 7 CRITERION MEASURES WERE USED TO TEST DEGREES OF ACHIEVEMENT INCLUDING--(1) THE PHILADELPHIA READING TEST (PRT), (2) A LINGUISTIC READING TEST, (3) WORD MEANING, (4) PARAGRAPH MEANING, (5) VOCABULARY, (6) SPELLING, AND (7) WORD STUDY SKILLS. WHEN THE TWO TREATMENT GROUPS WERE CONSIDERED AS A WHOLE (THAT IS, WITHOUT BREAKDOWN OF ABILITY SCORE LEVELS OR SEXES), AND WHEN THE EVIDENCE OBTAINED FROM ALL THE CRITERION VARIABLES WERE TAKEN INTO ACCOUNT, NO GENERAL STATEMENT COULD BE MADE ABOUT THE SUPERIORITY OF ONE APPROACH OVER THE OTHER. THERE WERE, HOWEVER, SIGNIFICANT DIFFERENCES BETWEEN TREATMENTS FAVORING THE BASAL READER GROUP FOR FIVE OF THE SEVEN CRITERION MEASURES. FINDINGS WITH RESPECT TO THE EFFECT OF ABILITY ON TEST SCORES WERE NOT SIGNIFICANT FOR EITHER TREATMENT. FOLLOWUP STUDIES ARE TO BE CONDUCTED AS THE CHILDREN PROGRESS THROUGH THE SECOND AND THIRD GRADES. (JH)

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COMPARISON OF READING ACHIEVEMENT OF FIRST-GRADE CHILDREN TAUGHT BY A LINGUISTIC APPROACH AND A BASAL READER APPROACH

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COOPERATIVE RESEARCH PROJECT NO. 2666

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Philadelphia, Pennsylvania

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Miss Barbara Doyle
Miss Mary Edwards
Miss Elmira High
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Mrs. Pauline Ivey
Mrs. Mildred Jeter
Mrs. Ida Kramer
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Mrs. Virginia Marten
Mrs. Ruth Moses
Mrs. Frances Pasternak
Mrs. Elizabeth Riley
Miss Helen Sandberg
Miss Sarah Simon
Miss Rose Stamm
Mrs. Ruth Teitell
Miss Elizabeth Walker
Mrs. Ruth White

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CHAPTER I

THE PROBLEM

Conventional reading materials used in the teaching of beginning reading were criticized over thirty years ago by Leonard Bloomfield (1933, pp. 499-503), a noted scholar in linguistics, because they presented words "in a mere hodge-podge, with no rational progression." Bloomfield urged stringent reforms in the teaching of beginning readint that would be based upon linguistic principles. Materials used for initial reading instruction, he suggested, should first present regularly-spelled words; irregularly-spelled words should not be introduced until later stages of instruction, and then only gradually and systematically. Based upon the linguistic principles that he advocated, Bloomfield prepared materials for teaching his own son to read. These materials were finally published some thirty years later (Bloomfield & Barnhart, 1961.)

Although Bloomfield (1942) elaborated on his theoretical notions and their practical applications, his work went virtually ignored for years until linguistic approaches to beginning reading instruction were also advocated by Soffietti (1955), Smith (1959), Hall (1961) and LeFevre (1964).

One of the more recent linguistic approaches for teaching beginning reading is the spelling-pattern approach emphasizing sound-symbol relationships of American English as described by Fries (1963) in Linguistics and Reading. Based upon the theoretical formulations and applications described in this text, Fries and three associates (1963-65) produced a series of experimental reading materials for use in the beginning stages of reading instruction. This series of eight readers and practice books was introduced into a number of first-grade classes in Philadelphia public schools on a trial basis.

The major objective of the research reported herein was to compare the reading achievement of first-grade children (at above average, average, and below average ability score levels) taught by the Fries linguistic approach with the reading achievement of first-grade children (at above average, average, and below average ability score levels) taught by a basal reader approach.

A minor objective of this study was to compare the varables that distinguish between high and low achievers in the linguistic group with the variables that distinguish between high and low achievers in the basal reader group.

Review of Research

The research literature on reading instruction abounds in comparative studies of various methods of teaching reading in first grade. Chall (1963) presented a preliminary report of her evaluation of various aspects of first-grade reading to the annual conference of the International Reading Association. After

reviewing a number of comparative studies, she noted that many of these investigations were poorly controlled, were based upon limited populations, and were inadequately described in terms of the similarities and differences of the reading methods being compared.

While numerous studies have been reported in which basal reader approach has been compared with various phonic approaches or individualized methods, reports of comparative studies involving a linguistic approach are scarce. Two such studies conducted with first-grade children were based upon the linguistic approach suggested by Bloomfield.

Sister Mary Fidelia (1959) involved 1,064 first-grade children from eleven schools in Chicago and nearby areas in a comparative study of a linguistic approach (based upon the work of Bloomfield) and a phonics approach. All the schools in the sample were in similar socio-economic areas. The experimental group used materials based on the Bloomfield linguistic approach, and the control group used a series of phonic workbooks called Phonics We Use. Both groups also used basal reading materials as part of their instructional program. Analysis of variance results indicated no significant differences in reading achievement between the two groups.

Bloomer (1960) compared the reading achievement of one class of first-grade children using a phonics approach "based on suggestions by Bloomfield" with the achievement of another class of children following a basal reader program. The experimental phonics group scored significantly higher in word recognition and sentence meaning. However, differences on para-

graph meaning were not significant.

It seems reasonable, as John B. Carroll (1961) suggests in Chapter 13 of his unpublished Educational Psychology and Educational Research, that two approaches to beginning reading may be differentiated by their method of programming the reading materials for instruction.

In a discussion of his use of the term "programming," Carroll says:

> We are speaking of "programming" in a fairly loose sense: any teaching procedure may be said to be "programmed" when it introduces new elements gradually (only one or a few at a time), when it calls for mastery or near-mastery of these elements before further elements are introduced, and when the introduction of any new element is prepared for by the proper selection of prior or prerequisite elements (p. 46).

Carroll suggests the hypothesis that "...the success or failure of programs of reading instruction depends not so much upon the degree to which phonic analysis is introduced, nor to its timing, but more upon the extent to which the instruction is properly programmed..." (p. 46).

In reviewing the research related to the controversy of the value of phonic systems as compared with basal reader systems in beginning reading instruction, Carroll asserts that "...the issue is not between 'phonics' and 'no phonics,' but between 'good programming' and 'poor programming.' It is out contention that the reason for the generally poor showing of 'phonics training' in many of the earlier educational experiments was that it was poorly programmed. ... [A] great deal of the beginning reading instruction in contemporary American schools is inferior because it is poorly programmed. Most of the basal readers in common use are poorly programmed. They present

letters and letter-meanings too fast and in too confusing an order" (pp. 61-62).

In examining the hypothesis stated above, Carroll points out that the interpretation of the term "element" is important for understanding the concept of programming as used here. If the element is considered to be "the word, we might have no great difficulty in concluding that current beginning readers are admirably 'programmed,' for they introduce words at a highly controlled rate,..." (p. 46). But if the "element" is considered to be the "letter or the letter configuration ... the programming leaves much to be desired" (p. 47). Carroll cites as an example one widely used primer in which four different words are introduced early in the text. These four words contain eleven different letters, and some with different sounds.

As Bloomfield noted over thirty years ago, and as other linguists have emphasized since, it is possible to program materials for beginning reading instruction in easy stages with regularly-spelled words. The linguistic readers prepared by Fries and others (1963, 1965) provide beginning reading materials that have been programmed in relatively small steps using spelling patterns as written representations of word patterns, while the beginning reading materials of the basal readers are programmed from the standpoint of a carefully controllec vocabulary consisting of high-frequency words that are repeated frequently. In contrast to the vocabulary of the linguistic reader the basal reader shows wide variation in the number of different letters and sounds. The materials and approaches used in the present investigation will be described in Chapter III.

Hypotheses

The purpose of this study was to test the following hypotheses:

1. There is no significant difference between the reading achievement of first-grade pupils taught by a linguistic approach and the reading achievement of first-grade pupils taught by a basal reader approach.

2. There is no significant difference between the reading achievement of first-grade pupils taught by a linguistic approach and the reading achievement of first-grade pupils taught by a basal reader approach at high, average, or low ability score levels.

3. There is no significant difference between the reading achievement of first-grade boys and the reading achievement of first-grade girls taught by a linguistic approach and by a basal reader approach.

4. There is no significant interaction between treatments and ability score levels in the reading achievement of first-grade pupils taught by a linguistic approach and by a basal reader approach.

5. There are no variables that are more highly related to the reading achievement for pupils in the linguistic approach than for pupils in the basal reader approach.

CHAPTER II

PROCEDURES

The present investigation, one of the 27 studies supported by the Cooperative Research Branch of the U. S. Office of Education, which constituted the first large-scale cooperative study of first-grade reading, was conducted during the 1964-65 school year. Two meetings were held at the coordinating center in the University of Minnesota in which the 27 project directors and the coordinating staff members agreed on types of data to be collected, specific measuring instruments to be used in the collection of the data, variables to be controlled, and procedures for collecting and treating the data.

While certain common procedures were employed in the 27 studies, each investigation retained certain unique aspects. The procedures described below include both the common and unique features contained in this investigation.

Design

The basic design of the investigation involved a comparison of the reading achievement of twelve classes of first-grade children who were taught to read by a basal reader

approach with the reading achievement of twelve classes of first-grade children taught by a linguistic approach. The twelve classes in each treatment group consisted of four classes at each of three ability score levels. The twenty-four classes of children, with only one class from each of twenty-four different schools, consisted of children who entered first grade in Philadelphia public schools in September 1964. The pupils in the 24 classes were grouped for analysis purposes into a 2 x 3 x 2 factorial design: treatment by ability score level by sex. The four classes at a given ability score level for a given treatment were formed into two cells, one of boys and one of girls.

Selection of Schools and Teachers

The first step in the process of selecting schools to participate in the experiment was carried out in the spring of 1964, when all elementary school principals in Philadelphia were sent a letter that described the project in detail. The letter invited principals interested in participating in the research project to submit the names of competent and experienced first-grade teachers in their school who volunteered to participate in the program. The principals were also asked to indicate the median IQ of the teacher's class as of the beginning of the experiment in September 1964. The median IQ's were based upon the scores on the Philadelphia Verbal Ability Test (PVA) administered to kindergarten pupils in the spring of 1964. This test provides IQ's in ten point intervals ranging from 80

to 120.

Seventy-five principals and nintey-seven teachers accepted the invitation to participate in the research project. (Several of the replies included the names of more than one teacher who had volunteered.)

Before proceeding with the final selection of classes, the average median IQ of the previous first-grade classes in each of the volunteering schools was obtained from the Division of Educational Research of the School District of Philadelphia. Teachers whose class median IQ was not typical of the median first-grade IQ for the school were eliminated from consideration.

The remaining schools were grouped into three PVA score levels; high (class median IQ's of 120 and 130); average (class median IQ's of 100 and 110); and low (class median IQ's of 80 and 90).[1] From this list, four different schools at each of the three ability score levels were randomly selected for each treatment group. The final step was the random selection of one teacher from each of the twenty-four schools. None of the principals or the teachers in either treatment group was informed in advance of the reading approach that would be used.

Description of the Sample

The sample used in this investigation is described below in terms of the community, the schools, the teachers and the pupils.

---

[1]These PVA score levels represent the ability score levels referred to throughout the remainder of this report.

The Community

Philadelphia, the fourth largest city in the nation, has a population of over two million persons. Based on 1960 census data, approximately three-quarters of this population were white. The one-quarter of the population that was non-white was composed mostly of American Negroes, with Puerto Ricans making up less than one per cent. Since 1950, the white population in the city has been decreasing, while the non-white population has been increasing. Although the non-white populations are largely concentrated in certain sections of the city, there are areas where the white and non-white populations are integrated in varying degrees. Like most large cities, the neighborhoods in Philadelphia vary from those that are entirely residential to those that are mixed residential and commercial. The quality of available housing within the city also varies widely from most desirable to least desirable. In many of the older, run-down areas, housing developments are being constructed.

Table 1 indicates the median income, median education, and population for each school neighborhood as obtained from the 1960 census tract data. Although the census tract does not necessarily correspond to the school district, the data from the census tract do in some measure describe the community in which the school is located. In general, there is a tendency for education and income to follow the trends of ability score levels in both treatment groups, with some overlap in adjacent ability score levels. While there is wide variation in population, there is some tendency for the schools with pupils at the low ability score level to be in neighborhoods with larger popu-

Table 1

COMMUNITY CHARACTERISTICS FOR SCHOOLS FOR CENSUS TRACT IN WHICH SCHOOL IS LOCATED

	Treatments							
	Basal Reader Approach				Linguistic Approach			
Ability Score Levels	Schools	Median Years of Education Completed by Adults	Median Income by Family & Unrelated Adults	Population	Schools	Median Years of Education Completed by Adults	Median Income by Family & Unrelated Adults	Population
High	A	12.1	$5,720	4,290	M	9.9	$5,993	6,246
	B	12.1	7,069	2,980	N	11.4	6,778	14,043
	C	12.3	6,697	6,824	O	12.1	7,278	8,289
	D	11.7	7,310	7,537	P	11.1	6,431	7,382
Average	E	8.7	4,834	18,671	Q	8.9	5,881	9,501
	F	10.8	5,027	6,152	R	10.5	5,046	10,428
	G	12.1	7,182	3,987	S	8.9	5,299	11,091
	H	10.9	5,917	8,375	T	10.5	4,631	7,660
Low	I	7.8	1,825	1,237	U	8.9	2,672	6,060
	J	8.6	2,510	8,733	V	8.9	4,028	16,796
	K	8.8	2,909	11,541	W	8.9	4,028	16,796
	L	8.3	4,801	13,613	X	9.4	3,748	8,857

Source: U. S. Bureau of the Census. U. S. Censuses of Population and Housing: 1960, Census Tracts. Final Report PHC (1) - 116. U.S. Government Printing Office, Washington, D. C., 1962.

lations. Although the School District policy at the time the data were gathered did not provide for school population breakdown on an ethnic basis, it was evident from census tract data that schools E and F in the basal reader group were in areas that had between 10 and 20 per cent Negro population; and schools J and K were in areas that were predominantly Negro. In the linguistic group, schools T, V, W, and X were in areas with predominantly Negro populations.

The Schools

The School District of Philadelphia is divided into eight administrative districts with a district superintendent responsible for each. In September 1964, when this experiment began, there were 204 elementary schools with a total enrollment of 155,949, and a first-grade enrollment of 25,517. Individual school populations ranged from schools with about 175 children to schools with about 2100 children.

The organization of the first three grades of the elementary school in Philadelphia was changed to an ungraded plan about four years ago. This ungraded primary unit is known as the Continuous Progress Primary (CPP) program and is designed for the grouping of children in the first three grades on the basis of intellectual maturity and achievement, and to provide for the adjustment of the program to the rate of development of the individual child. Except for a few schools having only one first year class, administrative provision is made for differences in levels of achievement and rates of progress.

To foster this continuous growth, the CPP program is

organized into levels based upon an arrangement of sequential skills and subject matter primarily in the areas of reading and arithmetic. For purposes of reading instruction, the program is organized into eight levels that parallel the books of the basal reading systems, that is from pre-reading and readiness material at level 1, through the 3^2 reader at level 8. For children who achieve above level 8 before advancement to grade 4, a ninth level is included to provide for enrichment through wide reading experiences and related activities. Some children may complete the Primary unit in two years, most complete it in three years, and some require four years.

The elementary school instructional program is organized into the following broad areas: language arts, social studies, arithmetic, science, physical education, health, art and music.

Each of the eight districts within the city have the services of supervisors, collaborating teachers, and consulting teachers. The supervisors work in the areas of art, music, and physical education. Collaborating teachers, of which there are usually three or four assigned to a district, are selected for three year periods to assist in the improvement of instructional programs in language arts, arithmetic, science and social studies. There is a consulting teacher assigned in each district for a three-year term to work with beginning teachers.

During the school year 1963-64 the School District of Philadelphia inaugurated the Educational Improvement Program (EIP) for first year classes of the primary unit where pupil achievement on standardized tests in the basic skills, particu-

larly reading, was significantly below "grade level" norms. This program provides for a class size limit of approximately 30 pupils, special consultants to assist teachers in the instructional program, and special supplementary teaching materials. All of the schools at the low ability score level in each treatment were EIP schools.

None of the schools in either treatment group had the services of a full-time librarian. Every classroom in the project had some library books. Those classes in the EIP program received additional supplies of library books.

The length of the school year for all pupils in the study was 186 days. Each school day was five hours long for all pupils.

The average per-pupil cost for instruction was $436.

Teachers

The 24 teachers who were selected for participitation in the experiment were all women and varied in age, total number of years of teaching experience, number of years of first-grade teaching experience, and attendance. The large variation is shown in Table 2. Nine of the teachers had 20 or more years of experience, while four teachers had less than 3 years of experience. There was a tendency for the younger and less experienced teachers to be associated with classes at the low ability score level in each treatment group.

One factor that may have contributed to this variation in experience and age of teachers among ability score levels is the teacher transfer policy under which more experienced teachers are permitted to transfer out of certain schools. Particularly

Table 2

MEANS AND RANGES FOR AGE, EXPERIENCE, AND ATTENDANCE[a] FOR TEACHERS

	Treatments					
	Basal Reader Approach Ability Score Level			Linguistic Approach Ability Score Level		
	High	Average	Low	High	Average	Low
Age						
Mean	47.25	50.50	37.00	48.75	47.50	32.25
Range	26-60	36-57	23-53	45-54	40-57	25-42
Total Years Teaching Exp.						
Mean	25.38	21.75	9.12	12.75	17.12	6.25
Range	4.5-40	11-31	0.5-20	6-18	4-27	2-14
Total Years First-Grade Teaching Exp.						
Mean	18.38	14.00	8.38	8.50	11.75	2.38
Range	4.5-31	5-25	0.5-17	2-16	1-24	1-5.5
Attendance[a]						
Mean	4.88	3.38	9.38	8.50	1.12	9.62
Range	1.5-11	1-6.5	5-18.5	4.5-11.5	0-2.5	4-19.5

[a]Based on number of days absent.

in large urban school systems there is wide variation in school settings in terms of social and cultural backgrounds of pupils, physical facilities for housing pupils, over-crowded conditions in many neighborhoods, and in the administration of schools by principals. Prior to 1957, there was an unrestricted tendency for experienced teachers to transfer from older schools located in lower socio-economic areas which were over-crowded and in which pupils were predominantly from culturally disadvantaged areas. Since 1957, the Philadelphia Board of Education has

limited transfers in any one year to 20% of the faculty in an elementary school; and established a ratio of one new teacher appointment for every two transfers. Special procedures and policies to promote further faculty and staff integration have been established.

The educational level of the 24 volunteer teachers, presented in Table 3, showed considerable variation, ranging from six who had less than a bachelor's degree to three who had a masters' degree. The majority of teachers in each treatment group had a bachelor's degree plus some additional graduate work. The spread of educational levels of teachers in the two treatment groups was almost identical, although the variation among the three ability score levels was marked.

Table 3

EDUCATIONAL LEVEL OF TEACHERS

Educational Level	Treatments							
	Basal Reader Approach Ability Score Level				Linguistic Approach Ability Score Level			
	High	Ave.	Low	Total Treatment	High	Ave.	Low	Total Treatment
Less than BA or BS	2	1		3	2	1		3
BA or BS		2		2		1	1	2
More than BA or BS but less than MA or MS	1	1	3	5	2	2	2	6
MA or MS	1		1	2			1	1

The Pupils

At the beginning of grade 1, the twenty-four classes participating in the experiment included 747 pupils, of whom 376 were taught by the linguistic approach and 371 were taught by the basal reader approach. At the end of grade 1, complete data were available for 674 pupils, of whom 347 were taught by the linguistic approach and 327 were taught by the basal reader approach. Data for 73 cases were not included in the final analysis because of pupil absence at the time when one or more of the tests were administered, of family transiency, of transfer out of experimental classes for regrouping purposes, and of a variety of additional reasons.

Class sizes varied between treatments and among ability score levels. Eight of the 24 classes began the experiment with less than thirty pupils and seven of the classes began with 35 or more pupils. While attempts were made to maintain the original size of classes in the experiment, pupils newly enrolled in a school were added to several of the classes in the experiment. In several instances, maintaining the original class size would have resulted in other first year classes in the school becoming larger than advisable for effective first year instruction. Table 4 shows the number of pupils who completed the pretests, the number of pupils who completed both pretests and posttests, and the number of pupils pretested who were not available for posttests.

As mentioned previously, the assignment of classes

Table 4

NUMBER OF PUPILS COMPLETING PRETESTS, POSTTESTS, AND PUPIL LOSS

Ability Score Level	School	Treatments								
		Basal Reader Approach								
		Pretests			Posttests			Loss		
		Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
	A	15	20	35	11	14	25	4	6	10
	B	13	26	39	12	25	37	1	1	2
High	C	16	15	31	16	15	31	0	0	0
	D	12	13	25	12	13	25	0	0	0
	E	18	17	35	16	17	33	2	0	2
	F	12	14	26	10	13	23	2	1	3
Average	G	27	14	41	26	14	40	1	0	1
	H	19	15	34	17	14	31	2	1	3
	I	13	10	23	10	7	17	3	3	6
	J	15	13	28	13	10	23	2	3	5
Low	K	20	16	36	15	11	26	5	5	10
	L	8	10	18	8	8	16	0	2	2
Totals										
High		56	74	130	51	67	118	5	7	12
Average		76	60	136	69	58	127	7	2	9
Low		56	49	105	46	36	82	10	13	23
Treatment		188	183	371	166	161	327	22	22	44
		Linguistic Approach								
	M	14	17	31	14	17	31	0	0	0
	N	18	15	33	17	15	32	1	0	1
High	O	17	13	30	16	13	29	1	0	1
	P	19	17	36	19	16	35	0	1	1
	Q	17	16	33	15	13	28	2	3	5
	R	17	17	34	14	13	27	3	4	7
Average	S	21	16	37	20	14	34	1	2	3
	T	15	15	30	15	15	30	0	0	0
	U	14	15	29	11	12	23	3	3	6
	V	10	18	28	9	18	27	1	0	1
Low	W	16	14	30	14	12	26	2	2	4
	X	15	10	25	15	10	25	0	0	0
Totals										
High		68	62	130	66	61	127	2	1	3
Average		70	64	134	64	55	119	6	9	15
Low		55	57	112	49	52	101	6	5	11
Treatment		193	183	376	179	168	347	14	15	29

to ability score levels was based upon results of the Philadelphia Verbal Ability Test (PVA). The mean PVA IQ's for classes grouped by treatments and ability score levels are shown in Table 5. Analysis of variance showed that differences between mean IQ's for treatments were not significant; as expected, there were significant differences in mean IQ's among ability score levels.

Table 5

MEAN IQ'S FOR CLASSES ON
PHILADELPHIA VERBAL ABILITY TEST (PVA)

	Treatments					
	Basal Reader Approach			Linguistic Approach		
Ability Score Level	School			School		
High	A	121.6		M	122.9	
	B	126.5		N	126.2	
	C	126.1		O	119.3	
	D	126.8		P	123.1	
N = 118	Cell Mean	125.2	N = 127	Cell Mean	122.9	
Average	E	109.7		Q	96.1	
	F	97.8		R	98.1	
	G	104.2		S	99.4	
	H	94.5		T	99.7	
N = 127	Cell Mean	101.6	N = 119	Cell Mean	98.3	
Low	I	83.5		U	80.4	
	J	90.0		V	84.4	
	K	80.0		W	83.8	
	L	98.1		X	84.8	
N = 82	Cell Mean	87.9	N = 101	Cell Mean	83.3	
Total N = 327	Treatment Mean	106.68	Total N = 347	Treatment Mean	102.94	

Teaching Approaches and Materials

The major objective of this study was to compare the reading achievement (at the end of the first grade) of children (at above average, average, and below average ability score levels) who were initially taught to read by two contrasting methods of reading instruction.

For this investigation two approaches of reading instruction which have contrasting assumptions and procedures were selected as the primary independent variable:

The Linguistic Approach

The Fries linguistic approach to beginning reading instruction is described in detail in Linguistics and Reading (1963), and incorporated in A Basic Reading Series Developed upon Linguistic Principles (C. C. Fries, A. C. Fries, Wilson and Rudolph, 1963-65). The Basic Reading Series includes an alphabet book, eight readers and practice books, and a teacher's manual.

The readers and practice books of the linguistic series were the basic instructional materials used in what Fries refers to as the "transfer stage" or the first stage of learning to read.

> The first stage in learning the reading process is the "transfer" stage. It is the period during which the child is learning to transfer from the auditory signs for language signals, which he has already learned, to a set of visual signs for the same signals. This process of transfer is not the learning of the language code or of a new language code; it is not the learning of a new or different set of language signals. It is not the learning of new "words," or of new grammatical structures, or of new meanings. These are all matters of the language signals which he has on the whole already learned so well that he is not conscious of their use. This

> first stage is complete when within his narrow linguistic experience the child can respond rapidly and accurately to the visual patterns that represent the language signals in this limited field, as he does to the auditory patterns that they replace (Fries, 1963, p. 132).

The following twelve principles are basic to an understanding of the linguistic approach (Fries, Wilson, and Rudolph, 1966):

1. Learning to read begins with and builds upon the oral language "control" already achieved by the pupil--his mastery of the language that he uses when he speaks and that he understands when it is spoken. Oral language activities that are appropriate to the environmental factors and to the maturity of the group and that provide for growth at each level are thus regarded as a vital part of the approach.

2. The vocabulary and the grammatical structures presented in the reading materials must be within the oral experience of the child and must keep pace with the widening of that experience. The reading matter in the program must at all stages be such as to permit the pupil to identify the written words as the same words he knows very well when he hears them spoken.

3. The vocabulary presented must lead gradually to a thorough assimilation of the three major patterns that characterize the great body of English spellings. The spelling-pattern approach is built upon, and takes advantage of, the very high degree of regularity that exists, despite all assertions to the contrary, in the spelling of present-day English.

4. Emphasis on minimum contrasts in words that are otherwise similar in spelling (mat-fat; mat-man; mat-met; mat-mate; etc.), if developed in carefully ordered succession, is the most effective means of teaching word recognition. Through early and continued training in perceiving minimum contrasts, the pupil will develop the habit of paying close attention to the words he is reading and will in time attain a great degree of proficiency in word recognition.

5. Instant recognition and discrimination of the letters of the alphabet in any sequence what-

soever is an essential preparation for learning to read.

6. The introduction of a limited number of high-frequency words (sight words) that do not conform to the spelling patterns being developed at the time is vital to provide reading material that has normal sentence patterns. However, since the main emphasis should be on the "regular" spelling patterns being presented, the written form of such sight words should not be given special attention.

7. Knowledge of the major spelling patterns (and of inflectional endings) can be immediately applied by the pupil to the reading of innumerable other words formed in accordance with or incorporating or resembling those basic patterns. (This principle has been confirmed at every stage in the experiemental use of the books. The word lists of the successive Readers in the present, formal edition reflect this fact.)

8. In the teaching of reading, there must be complete meaning responses by the child, not only to particular words but to those words in full sentences, and to those sentences in sequences of sentences. It is for this reason that the use of nonsense words should be avoided. Furthermore, because cumulative meaning is essential, the teaching procedures throughout the stories must be such as to take account of the different backgrounds and levels of maturity of the pupils. (It will be seen that the annotated editions of the Readers provide a second "track" for slower pupils.)

9. A continuing, known environment in the stories--representing ordinary settings and realistic experiences and characters--keeps the beginning reader from having to struggle to understand unfamiliar or fantastic concepts at the same time that he is learning to <u>do</u> reading. (In extensive classroom research, it has been found that pupils are so delighted with their own ability to read that they need nothing more to maintain their interest than such uncomplicated narratives <u>evidencing cumulative meaning</u> as now appear in the Readers.)

10. In order to focus the pupils' attention upon the reading materials themselves, pictures must be excluded from the basic series. Experience has consistently demonstrated that (<u>a</u>) pictures constitute a distracting element <u>in the process of</u>

learning to read, and (b) because pictures furnish clues to meaning, they lead the pupils to guess at words rather than to read them. (Incidentally, the absence of pictures permits the release of highly individualized creativity when the pupils are encouraged to illustrate the stories, for they are not hampered by the interpretation of another "artist".)

11. Early practice in writing (first sentences, then stories), if guided so as to utilize the patterns and the sight words presented in the reading text, reinforces the child's grasp of the major spelling patterns and of the grammatical structures of standard English.

12. The teaching procedure must permit what amounts to a daily evaluation of reading progress, and the program must make provision for the testing and further development of each pupil's specific abilities to interpret, recall, organize, draw conclusions, and write independently.

As the children using the linguistic series complete the eight readers, the practice books, and supplementary books, they will move into the appropriate instructional level of selected readers and other books exclusive of any instruction in phonics which these books might suggest. The general instructional program in reading for these children will follow that described in the "Continuous Progress Primary Description of Levels in Reading and Arithmetic" and "Suggestions for the Teaching of Reading, the Developmental Reading Program in the Elementary School," both publications of the School District of Philadelphia. Sample copies of these guides are on file with the U.S. Office of Education. However, any work with phonics suggested in these guides will be excluded from the reading program since the spelling-pattern approach has made this type of training unnecessary. Needed instruction in this area of word analysis skills will follow the linguistic principles developed in the

initial reading program

In the presentation of the story material of the readers, the directed reading approach is used, with silent reading preceding oral and questions presented to guide the silent reading as well as to check comprehension at the conclusion of the reading activity.

Some of the children have completed seven of the eight readers and practice books by the end of the first year, and the entire series early in the second year. Other children will probably complete the series by the end of the second year, while still others will not complete the materials until some time in the third year. A sample set of materials is on file in the U. S. Office of Education.

The Basal Reader Approach

The basal reader method was taught using the readers, workbooks, and teacher's manuals in The New Basic Readers published by Scott, Foresman and Company (Sixties Edition - revised 1962-63). The instructional program as described in each accompanying teacher's manual was followed as required in order to provide some control of the type of program being conducted.

The following basal reader materials were used:

Before We Read (Core readiness book)

We Read Pictures (Readiness book for immature first-graders)

We Read More Pictures (Readiness book for immature first-graders)

Sally, Dick and Jane (Pre-Primer I)

Fun With Our Family (Pre-Primer II)

Fun Wherever We Are (Pre-Primer III)

Guess Who (Junior Primer)

Fun With Our Friends (Primer)

More Fun With Our Friends (Book One)

Friends Old and New (Book Two - Part One)

More Friends Old and New (Book Two - Part Two)

These books were used with Think-and-Do-Books, vocabulary cards, and teacher's manuals. All children in the basal reader group did not necessarily use all of the materials listed above. The number of readers that each pupil completed depended upon the rate of progress of children within each class. For example, some pupils used all three readiness books while others used only one.

The New Basic Readers and guidebooks are designed to aid in teaching the children: to perceive the sounds of our language; to associate meanings with words; to build a sight vocabulary; to grasp clues to meaning from syntax; to identify an author's purpose, organization, and implied meaning; and to develop word-perception skills.

Two differences between the basal reader approach and the Fries linguistic approach are the programming of the basic elements of the reading materials and the variety of sentence patterns contained in the beginning reading materials.

The vocabulary of the basal reader is programmed from the standpoint of the carefully controlled number of high-frequency words introduced (as indicated on various word counts of childrens' reading materials and the reinforcement of

recognition of new words through spaced repetition. In the beginning, the words in the basal reader are learned as sight words, and techniques for encouraging word discrimination are gradually introduced through guided apprehension of common elements of words already familiar in print. As each sound element is grasped through study of familiar words, it is employed as a clue to the pronunciation of unfamiliar printed words. The sentence patterns in the basal readers show little variation.

An important aspect of the basal reader approach is the readiness activity which precedes the first silent reading of the material. During this readiness period, the teacher discusses the vocabulary and concepts which are involved in the story in order to help the reader relate the appropriate experiential and language background to the words which he is being asked to identify.

Supervision of Instruction

The instructional program in each treatment group is supervised by an experienced supervisor who is thoroughly familiar with the teaching procedures and materials for the particular approach. Each of the supervisors has had years of experience as a classroom teacher as well as previous supervisory experience. Mrs. Mildred K. Rudolph, one of the authors of the linguistic readers, supervised the teachers in the linguistic approach; and Mrs. Anita Theil supervised teachers in the basal reader approach. Each supervisor visited each of her twelve classes approximately once

every two weeks with approximately twenty visits to each teacher. In addition to guiding the use of the instructional materials and offering demonstration lessons, the supervisors attempted to make certain each teacher was adhering to the particular approach she was supposed to be using. The supervisor made certain that each teacher had appropriate materials to meet the range of instructional levels within each class.

In addition to the services of the supervisors, teachers in each treatment had access to professional consultants who were specialists in the particular reading approach. The consultant for the linguistic approach was Mrs. Rosemary G. Wilson, Assistant Director in charge of Reading for the School District of Philadelphia, who was one of the authors of the instructional materials in the linguistic approach. The consultant for the basal reader group was Dr. Mary E. Coleman, Associate Professor of Education at the University of Pennsylvania, whose specialization is the teaching of reading and language arts in the elementary school.

Prior to the initiation of the pretesting program in September, teachers in both treatment groups met with the project director, research assistant, the two supervisors and the two consultants, for an intensive two-day workshop. After the project director presented the purposes and nature of the research project, the supervisors and consultants discussed the testing materials and testing procedures that would be used for initial and final testing. The testing materials themselves, however, were not made available until just prior to the ac-

tual testing period. The remainder of the workshop was devoted to a discussion and demonstration of the materials to be used and methods to be emphasized in each of the two instructional approaches.

After the instructional period had begun, the project director accompanied by one of the consultants visited each of the twenty-four classes. During these visits, the project director observed the reading sessions and offered suggestions or answered questions posed by the teacher. Following each visit, the project director, supervisor, and consultant, met with the teacher and principal to discuss the progress of the experimental research and to cope with any problems that may have arisen during the preceding experimental period.

The various members of the research project, including the director, supervisors, consultants, teachers, and principals communicated by telephone as instructional or administrative problems arose.

Time Allotments

The publications of the Philadelphia Schools recommend the following weekly time allotments for the instructional program of first year pupils:

	Time in Minutes per Week
Language Arts	
Reading and literature	525
Spelling, handwriting, written, and oral expression	150
Social Studies and Science	200

Observations made by the project director and the supervisors indicated that while there was some variation in actual time spent by teachers in reading instruction, teachers were spending approximately two hours per day in activities related to instruction in reading exclusive of the other language arts, social studies, and science activities.

Testing Program

An extensive pretesting and posttesting program was devised by the 27 project directors to evaluate various aspects of reading readiness, and achievement in reading and related language arts areas. The pretests, which consisted of three readiness tests and an intelligence test, were administered to all pupils in the two treatment groups during the last two weeks of September and in some cases, during the first week of October. The posttests, which measured various aspects of silent and oral reading, spelling, written composition,and attitude toward reading, were administered during the last two weeks in May, and in some cases, extending into the first two weeks of June, following the completion of the 140 day instructional period.

Each of the four pretests was administered as a group test by the classroom teacher with the assistance of another local school person or a research staff member. The following pretests were administered to each pupil: (1) the Murphy-Durrell Diagnostic Readiness Test; (2) the Metropolitan Readiness Test; (3) the Pintner-Cunningham Primary Test of General Ability; and (4) the Thurstone Tests for Identical Forms and Pattern Copy-

ing.

It was recommended to teachers that the tests be given in the order listed above, and that they be given to small groups over several sittings, particularly, in cases where the children were less mature and tired more easily. Teachers were also asked not to begin instruction until the pretesting was completed. In actual practice, some schools (particularly those in the high ability score group) completed the initial testing in less than two weeks and began their 140 day experimental period on the next school day. Some schools (particularly those in the low ability score group), needed as many as four weeks to complete the initial test battery. All schools had completed all initial tests by October.

The increased amount of time required by the schools in the low ability score group was due to the necessity of administering the tests to smaller groups. Since these children tended to be less mature, less familiar with the use of writing materials and less experienced in following oral directions, only a few children could be tested at a time. In some cases, a class was divided into five or six small groups for the initial testing and therefore, several testing sessions were required to complete all of the subtests of a given instrument.

In general, most of the pupils at the low ability score level were from culturally disadvantaged environments. The teachers and principals reported that many of the pupils had difficulty understanding and following the directions for several of the tests, even after the sample items had been presented. Many of these youngsters had never held a pencil

in their hands and had extreme difficulty following such directions as "mark a cross on the calendar... ." Even after the marking procedure had been illustrated, some children had great difficulty in holding their pencils correctly and marking the test items.

The posttesting period began on the first school day after the 140 day instructional period. All subtests of the Stanford Achievement Test, Primary I Battery, Form X, were completed first. Some pupils completed the entire test within five school days, while others took two or three additional days. In addition to the Stanford Test, all pupils in both treatment groups took the Philadelphia Reading Test (PRT), the Reading Test - A Linguistic Approach, (hereafter called Linguistic Reading Test), and the San Diego Pupil Attitude Inventory. The PRT and the Linguistic Reading Test were silent reading tests included in the local aspect of the investigation. As with the pretests, pupils in the low ability score group took the tests in smaller groups spread over several sittings. Children in the higher ability score group were able to take the tests as an entire class. All tests were administered by the classroom teacher with the assistance of a member of the research staff, of the principal, or of another teacher.

A second set of achievement tests was administered individually to a sample from each treatment group. A sample of 50 pupils was drawn randomly from each of the two treatment groups, a total of 100 pupils, using a table of random numbers as a basis for determining the pupils to be selected. However, some of the pupils did not complete all of the measures, and the

sample consisted of 77 pupils, 46 from the basal reader approach and 31 from the linguistic approach.

The following tests were administered individually to each of the pupils in the subsample: (1) The Gilmore Oral Reading Test, Form A; (2) the Gates Word Pronunciation Test; and (3) the Fry Phonetically Regular Words Oral Reading Test.

As a final measure of achievement, two writing samples were obtained from all pupils in the two treatments following directions provided by a sub-committee of project directors. (See Appendix for copy of directions.) The first measure was restricted to a stimulus that was similar for all of the federal projects. The second writing sample was unique to the local project. All of the written samples were collected by the research staff, but only the restricted stimulus measures written by the 77 children in the subsample who took the individually administered oral reading tests were analyzed. Three scores were obtained: (1) a mechanics-ratio score that resulted from computation of errors in punctuation, capitalization and paragraphing; (2) the total number of words spelled correctly; and (3) the total number of running words.

Treatment of the Data

All test scores and other pertinent data were punched on IBM cards and the data analyzed on a computer. Raw-score means, standard deviations, standard errors of the mean, and correlation coefficients were computed. The correlation matrix was examined to determine the degree of relationship between pretest variables and criterion variables.

The significance of the mean score differences of the pretest variables for treatments, ability score levels, and sexes was tested by analysis of variance in a 2 x 3 x 2 factorial design: Treatments X Ability Score Level X Sex. Fourteen criterion variables (seven criterion variables for the total sample and seven criterion variables on the subsample) were analyzed using an analogous analysis of covariance design, with six variables controlled statistically.

When the analysis of covariance revealed significant F values for treatments, sexes, or ability score levels, the Newman-Keuls procedure for selected comparisons was employed for comparing the significance of differences of adjusted means within specified levels (Winer, 1962).

The results of the data analysis are presented in Chapter III.

CHAPTER III

ANALYSIS OF THE DATA

This chapter presents: (1) the analysis of teacher data; (2) the analysis of pupil data including pretests and the other pertinent factors; (3) an examination of variables for their usefulness in adjusting the mean scores on outcome measures; and (4) the analysis of the outcome measures.

To assess the status of the two treatment groups in terms of potential for reading achievement prior to the beginning of the experimental period, a pretest battery consisting of three readiness tests and an intelligence test was administered to pupils in the 24 classes. Pupil data for chronological age, attendance, and amount of preschool experience were also collected. Teacher data were obtained for age, total years of teaching experience, total years of teaching first grade, attendance, and principal's rating. Following the completion of the 140 day instructional period, a series of silent reading tests were administered to all pupils who had completed the experiment. A series of oral reading tests were administered individually to a randomly selected subsample from each treatment. Two writing samples were obtained from all pupils, but were

analyzed only for pupils in the subsample.

Correlations between predictor variables and criterion variables were computed. Mean differences between treatments for the predictor variables were tested, and criterion variable means were adjusted through analysis of covariance techniques for the influence of predictor variables that were related to achievement. The .05 level was used for determining significance of differences between means.

Analysis of Predictor Variables for Teachers

Teacher data for age, total years of teaching experience, first-grade teaching experience, educational level, attendance, and principal's rating were obtained.

The means and standard deviations for teachers' age, total years of teaching experience, first-grade teaching experience, and teachers' attendance by treatments and ability score levels are shown in Table 6; the analysis of variance *F* ratios are presented in Table 7.

Age

In the basal reader group the teacher ages ranged from 23 to 60 years; in the linguistic group the teacher ages ranged from 25 to 57 years. There were no significant differences in means for teachers' age between treatments, although as a whole, the basal reader teachers tended to be somewhat older. Mean differences for teachers' age among ability score levels were significant at the .05 level, with the older teachers tending to be in classes at the high and average ability score levels,

and the younger teachers tending to be in classes at the low ability score level.

Table 6

MEANS AND STANDARD DEVIATIONS FOR AGE, EXPERIENCE, AND ATTENDANCE[a] FOR TEACHERS

	Treatments					
	Basal Reader Approach			Linguistic Approach		
	Ability Score Level			Ability Score Level		
Variable	High	Average	Low	High	Average	Low
			Means			
Age	47.75	50.50	37.00	48.75	47.50	32.25
Years Teaching	25.38	21.75	9.12	12.75	17.12	6.25
Years Teaching First-Grade	18.38	14.00	8.38	8.50	11.75	2.38
Attendance[a]	4.88	3.38	9.38	8.50	1.12	9.62
			Standard Deviations			
Age	14.90	8.44	11.75	3.34	7.23	6.50
Years Teaching	14.58	8.47	8.56	4.66	9.47	4.92
Years Teaching First-Grade	9.73	7.28	7.65	5.17	9.94	2.61
Attendance[a]	3.80	2.43	5.33	2.62	1.14	6.14

[a]Based on number of days absent.

Table 7

ANALYSIS OF VARIANCE F RATIOS FOR AGE, TOTAL TEACHING EXPERIENCE, FIRST-GRADE TEACHING EXPERIENCE, AND ATTENDANCE FOR TEACHERS

Source of Variation	df	F Ratios			
		Age	Total Years Teaching Exp.	Total Years First-Grade Teaching Exp.	Attendance[a]
Treatment (T)	1,18	.25	2.49	2.99	.13
Ability Score Level (A)	2,18	4.39*	3.24	2.22	5.11*
T x A	2,18	.15	.49	.40	.81

*Significant at .05 level.
[a]Attendance based on number of days absent.

Total Teaching Experience

The teachers varied widely in total years of teaching experience. In the basal reader group, the range was from 5 months to 40 years, and in the linguistic group, from 2 years to 27 years. The more experienced teachers tended to be associated with classes at the high and average ability score levels, while less experienced teachers tended to be found with classes at the low ability score levels. Although the basal reader teachers as a group tended to have more experience, the differences between treatments or among ability score levels were not significant at the .05 level.

First-Grade Teaching Experience

There was also a wide variation in the mean number of years of first-grade teaching experience among the teachers in

the two treatment groups. The more experienced teachers in both treatment groups tended to be associated with classes at the high and average ability score levels, while the less experienced teachers tended to be associated with the classes at the low ability score level. One factor contributing to this tendency has previously been discussed on pages 14 to 16.

While the teachers in the basal reader group tended to have more experience, mean differences between teachers in the two treatments and among teachers at the three ability score levels for first-grade experience were not significant at the .05 level.

Attendance

The differences among teachers at the three ability score levels within each treatment are greater than those between treatments. The differences between treatments were not significant at the .05 level, but the differences among ability score levels were significant. Teachers in classes at the low ability score level in both treatment groups had the greatest number of absences.

Principal's Rating

The mean ratings of teachers by their principals are shown in Table 8. The ratings are based on a three point scale in which a rating of 3 is the highest possible rating and 1 is the lowest. The ratings of teachers in the linguistic group showed much greater variation. Differences in mean ratings between treatments were significant at the .01 level (as shown in Table 9), with the teachers in the basal reader group tend-

Table 8

MEAN RATINGS OF TEACHERS BY PRINCIPALS

Ability Score Level	Treatment		
	Basal Reader Approach	Linguistic Approach	Total
High	3.00	1.75	2.38
Average	3.00	2.75	2.88
Low	2.50	1.75	2.13
Total	2.83	2.08	2.49

Table 9

ANALYSIS OF VARIANCE F RATIOS FOR
RATING OF TEACHERS BY PRINCIPALS

Source of Variation	df	F Ratios
Treatment (T)	1, 18	11.65**
Ability Score Level (A)	2, 18	4.03*
T x A	2, 18	1.72

*Significant at .05 level.
**Significant at .01 level.

ing to have the higher ratings. Differences among ability score levels were significant at the .05 level with teachers of classes at the average ability score level receiving the highest ratings and at the low ability score level the lowest ratings.

Analysis of Predictor Variables for Pupils

Pupil data for age, preschool experience, attendance, reading readiness, and intelligence are reported below.

Chronological Age

Mean ages were calculated for boys and girls at the three ability score levels in the two treatment groups. At the beginning of first-grade, the average chronological age for the boys was slightly higher than for the girls ($.10 > P. > .05$). Differences between treatments and among ability score levels were not significant. Means and standard deviations for pupil age and attendance, for treatments, ability score levels, and sexes are shown in Table 10; analysis of variance results are presented in Table 11.

Attendance

The number of absences were obtained for each child in the experiment. There were no significant differences in mean number of absences between treatments or sexes. There were no significant differences in means among ability score levels, with pupils at the low ability score level having the greater number of absences. None of the interactions was significant.

Table 10

MEANS AND STANDARD DEVIATIONS FOR AGE[a] AND ATTENDANCE OF PUPILS[b]

Group	Age[a]	Attendance[b]
	Means	
High Basal Boys	74.51	10.80
High Linguistic Boys	74.35	10.82
High Basal Girls	74.43	10.34
High Linguistic Girls	74.02	10.46
Average Basal Boys	74.86	10.03
Average Linguistic Boys	75.73	10.78
Average Basal Girls	73.74	9.26
Average Linguistic Girls	74.49	10.29
Low Basal Boys	75.59	15.39
Low Linguistic Boys	73.84	11.37
Low Basal Girls	74.35	12.49
Low Linguistic Girls	74.35	12.19
Total Treatments		
Basal Reader	74.56	11.11
Linguistic	74.50	10.95
	Standard Deviations	
High Basal Boys	4.03	6.44
High Linguistic Boys	3.42	6.34
High Basal Girls	3.69	7.67
High Linguistic Girls	3.08	7.44
Average Basal Boys	3.85	7.60
Average Linguistic Boys	4.20	8.86
Average Basal Girls	4.36	5.74
Average Linguistic Girls	3.58	8.48
Low Basal Boys	5.49	12.21
Low Linguistic Boys	4.41	9.86
Low Basal Girls	5.00	10.62
Low Linguistic Girls	3.49	10.73
Total Treatments		
Basal Reader	4.34	8.53
Linguistic	3.74	8.57

[a]Age in months.
[b]Attendance based on number of days absent.

Table 11

ANALYSIS OF VARIANCE F RATIOS FOR AGE[a] AND ATTENDANCE[b] FOR PUPILS

Source of Variation	df	F Ratios	
		Age[a]	Attendance[b]
Treatment (T)	1,663	.14	.36
Ability Score Level (A)	2,663	.54	5.99**
Sex (S)	1,663	3.42	1.09
T x A	2,663	2.47	1.74
T x S	1,663	.51	1.06
A x S	2,663	1.00	.07
T x A x S	2,663	.96	.72

**Significant at .01 level.
[a]Age reported in months.
[b]Attendance reported as number of days absent.

Preschool Experience

Data for kindergarten experience were available from school records. The amount of pre-first-grade school experience were available from two treatments at the three ability score levels is shown in Table 12. A chi square test was run on the 2 x 4 table showing the frequency with which pupils in the basal reader approach and the linguistic approach fell into each of the four categories of amounts of preschool experience. A chi square of 23.21 with three degrees of freedom was obtained indicating that the pattern of preschool ex-

Table 12

AMOUNT OF PRE-FIRST-GRADE SCHOOL EXPERIENCE

	No Experience		Experience Up to & Including 1/2 Year		More than 1/2 Year Up To & Including 1 Year		More Than One Year		
	N	Per cent of Total	N	Per cent of Total	N	Per cent of Total	N	Per cent of Total	Total
Basal Reader	81	25.00	113	34.45	124	37.80	9	2.74	327
High	1	0.85	38	32.20	79	66.95	0	0.00	118
Average	22	17.32	73	57.48	23	18.11	9	7.09	127
Low	58	71.08	2	2.41	22	26.51	0	0.00	82
Linguistic	86	24.78	73	21.04	185	53.31	3	0.86	347
High	1	0.79	3	2.36	122	96.06	1	0.79	127
Average	33	27.73	55	46.22	29	24.37	2	1.68	119
Low	52	51.48	15	14.85	34	33.66	0	0.00	101

Due to rounding, all per cents do not sum to 100.00.

perience was significantly different at the .01 level for children in the basal reader and linguistic approaches. More children in the linguistic approach had more than one-half year experience, while there were a greater number of children in the basal reader group who had one-half year or less preschool experience.

Reading Readiness

Three reading readiness tests were administered to all pupils in the study: The Metropolitan Readiness Test, the Murphy-Durrell Diagnostic Readiness Test, and the Thurstone tests for visual perception: Pattern Copying and Identical Forms.

The Metropolitan test consisted of six subtests designed to measure knowledge of word meaning, listening ability, visual matching ability, knowledge of the alphabet, number knowledge, copying ability, and a total score. The means and standard deviations for treatments, sexes, and ability score levels are shown in Table 13. Analysis of variance *F* ratios are reported in Table 14.

Significant differences at the .05 level or beyond, favoring the basal reader group, were found between treatment means for four of the subtests and for the total score. The four subtests were Listening, Alphabet, Numbers, and Copying.

Differences among ability score levels were significant at the .05 level or beyond, for all six subtests and for the total score, with pupils at the high ability score level having the highest means and pupils at the low ability score level having the lowest means.

Table 13

MEANS AND STANDARD DEVIATIONS FOR
METROPOLITAN READINESS TEST

Group	Word Meaning	Listening	Matching	Numbers	Copying	Alphabet	Total
				Means			
High Basal Boys	11.25	10.10	10.65	17.55	9.92	13.57	73.04
High Ling. Boys	10.65	9.89	10.74	16.76	7.85	12.33	68.23
High Basal Girls	10.49	10.42	11.09	16.40	9.31	13.45	71.16
High Ling. Girls	9.66	9.16	11.08	15.80	8.59	12.64	66.93
Ave. Basal Boys	7.58	7.81	8.26	10.45	5.28	8.38	47.77
Ave. Ling. Boys	7.11	7.41	7.52	9.64	4.94	6.11	42.72
Ave. Basal Girls	6.81	7.81	8.29	10.43	5.52	7.90	46.76
Ave. Ling. Girls	6.13	7.15	7.20	9.07	4.27	6.93	40.75
Low Basal Boys	4.76	6.43	4.72	5.46	1.63	3.80	26.80
Low Ling. Boys	4.92	5.39	3.90	5.35	1.53	2.59	23.67
Low Basal Girls	4.16	6.05	3.97	6.03	2.51	3.62	26.35
Low Ling. Girls	5.08	6.56	4.12	5.85	2.04	3.50	27.13
Total Treatments							
Basal	7.83	8.31	8.23	11.57	6.04	8.96	50.94
Linguistic	7.46	7.73	7.69	10.81	5.11	7.68	46.49
				Standard Deviations			
High Basal Boys	2.67	2.33	2.68	3.45	2.44	2.62	9.47
High Ling. Boys	2.39	2.25	2.53	3.64	3.40	3.42	10.42
High Basal Girls	2.25	2.48	2.70	3.24	2.69	2.34	9.70
High Ling. Girls	2.59	2.51	2.78	3.73	2.65	2.83	10.31
Ave. Basal Boys	2.39	2.53	3.19	4.05	3.10	3.98	12.92
Ave. Ling. Boys	2.55	2.11	3.02	3.43	2.78	3.40	10.76
Ave. Basal Girls	2.16	1.97	2.43	3.61	2.80	4.26	11.20
Ave. Ling. Girls	2.38	1.92	2.90	2.90	2.46	3.58	9.26
Low Basal Boys	2.35	2.56	2.60	3.15	2.13	3.25	11.16
Low Ling. Boys	2.85	2.51	2.52	1.93	2.06	2.31	8.72
Low Basal Girls	2.05	2.39	2.94	3.26	2.59	3.68	12.10
Low Ling. Girls	2.58	1.92	2.30	2.17	1.83	2.60	7.04
Total Treatments							
Basal	3.41	2.86	3.74	5.63	3.99	5.23	20.93
Linguistic	3.36	2.67	3.87	5.42	3.71	4.97	19.82

Table 14

ANALYSIS OF VARIANCE *F* RATIOS FOR METROPOLITAN READINESS TEST

Source of Variation	df	Metropolitan Subtests						
		Word Meaning	Listen-ing	Match-ing	Alpha-bet	Numbers	Copy-ing	Total
Treatment (T)	1,663	1.76	8.09**	3.58	17.78**	6.13*	15.78**	21.22**
Ability Score Level (A)	2,663	306.54**	147.82**	312.20**	445.00**	595.28**	367.56**	959.92**
Sex (S)	1,663	11.86**	.01	.00	.63	1.08	.78	.42
T x A	2,663	3.92*	.51	1.90	1.11	1.04	2.31	2.41
T x S	1,663	.07	.05	.16	3.22	.08	.00	.52
A x S	2,663	1.19	1.00	.91	.09	2.97	1.54	1.42
T x A x S	2,663	.66	4.23*	.81	.28	.19	2.94	.73

*Significant at the .05 level.
**Significant at the .01 level.

Treatment and ability score interaction was significant at the .05 level only for the Word Meaning subtest. None of the other two-way interactions was significant. The three-way interaction among treatment and sex and ability score level was significant at the .05 level for the Listening test. In the analysis of variance results reported in Tables 11, 14 and 16, three of the 44 interactions for pretests were significant; of 44 interactions, 2.2 would be expected to be significant by chance at the .05 level. Since the observed and expected values are so similar, these interactions will be assumed to be due to chance.

Differences between means for sexes were significant only on the Word Meaning subtest, and were significant at the .01 level. This significant difference favored the girls. The intercorrelations between the subtest scores and total test scores were high, positive, and significant. Since all of the subtests were found to correlate highly with the total test score and had similar correlations with criteria, the subtest scores are not used separately in the subsequent analysis.

The Murphy-Durrell Diagnostic Readiness Test contains subtests that measure the ability to hear sounds in words, knowledge of letter names, and ability to learn and recall word forms. Means and standard deviations for treatment groups, ability score levels, and sexes are shown in Table 15; analysis of variance *F* ratios are shown in Table 16.

Significant differences between treatment means were found for the Phonemes, Letter Names, and Learning Rate sub-

Table 15

MEANS AND STANDARD DEVIATIONS FOR
MURPHY-DURRELL DIAGNOSTIC READINESS TEST

Group	Phonemes	Letter Names	Learning Rate
		Means	
High Basal Boys	31.45	45.94	11.29
High Linguistic Boys	26.48	42.26	11.62
High Basal Girls	35.01	46.36	12.13
High Linguistic Girls	29.77	43.07	10.64
Average Basal Boys	16.74	30.42	9.23
Average Linguistic Boys	13.16	24.12	8.06
Average Basal Girls	19.00	29.84	9.16
Average Linguistic Girls	13.11	26.44	7.62
Low Basal Boys	6.96	14.17	6.50
Low Linguistic Boys	5.14	14.10	6.90
Low Basal Girls	7.73	13.57	6.00
Low Linguistic Girls	6.71	12.88	7.13
Total Treatments			
Basal	20.77	31.81	9.38
Linguistic	16.51	28.17	8.82
		Standard Deviations	
High Basal Boys	12.88	6.58	4.14
High Linguistic Boys	12.70	8.85	3.83
High Basal Girls	9.93	6.22	3.76
High Linguistic Girls	12.78	8.31	3.76
Average Basal Boys	11.44	13.28	3.19
Average Linguistic Boys	9.38	10.28	3.07
Average Basal Girls	10.51	12.54	2.79
Average Linguistic Girls	9.34	10.66	2.63
Low Basal Boys	7.41	9.59	3.67
Low Linguistic Boys	3.65	7.85	3.26
Low Basal Girls	7.09	8.71	3.48
Low Linguistic Girls	4.57	8.30	3.26
Total Treatments			
Basal	14.64	16.01	4.09
Linguistic	13.41	15.03	3.79

Table 16

ANALYSIS OF VARIANCE F RATIOS FOR
MURPHY-DURRELL DIAGNOSTIC READINESS TEST

Source of Variation	df	Murphy-Durrell Subtests		
		Phonemes	Letter Names	Learning Rate
Treatment (T)	1,663	22.97**	15.00**	2.12
Ability Score Level (A)	2,663	316.90**	541.54**	106.05**
Sex (S)	1,663	5.89*	.06	.33
T x A	2,663	2.04	2.89	5.00**
T x S	1,663	.15	.35	.82
A x S	2,663	1.01	.50	.05
T x A x S	2,663	.34	.48	1.86

*Significant at the .05 level.
**Significant at the .01 level.

tests. Mean differences for the Phonemes and Letter Names subtests were significant at the .01 level. The basal reader treatment group had significantly higher means for all three subtests.

Differences among means for ability score levels were significant beyond the .01 level for all three subtests, with the high ability score level having the highest means and the low ability score level having the lowest means.

The mean score for girls on the Phonemes subtest was significantly higher at the .05 level.

Interaction between treatment and ability score level

was significant at the .05 level for the Learning Rate subtest. None of the other interactions was significant.

The Thurstone readiness tests, although administered as pretests, were not included in the final analysis because there was evidence that they were not administered appropriately in several instances, and the scoring of both tests was questionable. In addition the pattern of intercorrelations with criteria and other pretest variables indicate that these tests would account for little unique variance.

Intelligence

The Pintner-Cunningham Primary Test of General Ability was the intelligence test agreed upon for administration to all pupils in the Cooperative Research Program projects. This test was used in addition to the PVA that was used to group pupils, since the PVA is routinely used for grouping in the Philadelphia Schools. The means and standard deviations for treatments, ability score levels, and sexes are reported in Table 17, and analysis of variance F ratios are shown in Table 18.

The basal reader treatment group had a raw score mean that was significantly higher than that of the linguistic group at the .01 level. There were significant differences beyond the .01 level among ability score levels. As expected, pupils at the high ability score levels in both treatment groups obtained the highest means and pupils at the low ability score level achieved the lowest means.

The findings for the total raw scores from the Pintner-Cunningham test and the total raw scores from the PVA are sim-

Table 17

MEANS AND STANDARD DEVIATIONS FOR
PINTNER-CUNNINGHAM PRIMARY TEST, RAW SCORE

Group	Means	Standard Deviations
High Basal Boys	42.31	6.66
High Linguistic Boys	40.18	7.31
High Basal Girls	42.94	5.18
High Linguistic Girls	41.20	7.06
Average Basal Boys	29.35	9.61
Average Linguistic Boys	28.12	7.94
Average Basal Girls	31.45	8.20
Average Linguistic Girls	26.84	8.45
Low Basal Boys	17.50	8.13
Low Linguistic Boys	16.29	6.96
Low Basal Girls	17.76	7.62
Low Linguistic Girls	18.77	8.12
Totals		
Basal Reader	31.54	12.39
Linguistic	29.44	12.13

Table 18

ANALYSIS OF VARIANCE F RATIOS FOR
PINTNER-CUNNINGHAM PRIMARY TEST, RAW SCORE

Source of Variation	df	F Ratio
Treatment (T)	1,663	7.56**
Ability Score Level (A)	2,663	516.29**
Sex (S)	1,663	2.08
T x A	2,663	1.76
T x S	1,663	.05
A x S	2,663	.20
T x A x S	2,663	1.89

*Significant at .05 level.
**Significant at .01 level.

ilar in that results on both tests indicated significant differences between the treatment groups that favored the basal reader group. It should be recalled that the analysis of PVA test results based on IQ's instead of raw scores did not show this significant difference (see page 19). Results of the reading readiness tests previously reported also indicated that treatment differences favored the basal reader group.

Each of the seven criterion variables administered to the total sample was correlated with the predicter variables separately for the boys and girls within each group at each ability score level. These individual within-cell correlations are based on n's ranging from 37 to 69. For each predicter variable medians were computed of 84 separate correlations (1 correlation for each of 12 cells with 7 criterion variables).

The median within-cell correlations are presented in Table 19 along with the summary of analysis of variance results for treatment, sex, and ability main effects, and treatment by ability interaction.

Selection of Covariates for Control of Relevant Predicter Variables

It was hoped that the random assignment of teachers and classes to treatment groups would balance the two method groups on variables that could affect criterion performance including variables for which data were gathered before the instructional period began. Since there were significant differences between the two treatment groups on several of the pupil pretest and teacher variables, it was desirable to adjust the mean scores

on the outcome measures for the influences of these initial differences.

Variables were selected as covariates when the median within-cell correlation was greater than .09 (significant at the 5 per cent level) and when there was a significant F for treatment, sex, or treatment and ability interaction. The differences among ability score levels were not of as much interest since ability levels were already controlled in the factorial design and the readiness variables were related to ability score level and would provide additional control when their effect was removed through analysis of covariance. Variables chosen as covariates on the basis of these criteria included the three Murphy-Durrell subtests (Phonemes, Letter Names, and Learning Rate), the Metropolitan Readiness total score, and the Pintner-Cunningham total raw score. In addition, pupil chronological age, on which there was a small significant correlation and a nearly significant difference between sexes, was controlled through the analysis of covariance.

The method selected for this purpose was analysis of covariance in a 2 x 3 x 2 design: treatment by ability score level by sex.

The results of the analysis of covariance of each of the seven criterion variables will be presented in the next section. The effect of the predictor variables was controlled statistically by adjusting the scores on the criterion measures by analysis of covariance techniques. Adjusted mean differences represent

the best estimate of pupil reading achievement when the influence of the six predictor variables has been controlled.

When significant F values were shown for interactions for treatments, sexes or ability score levels, the Newman-Keuls sequential range test was used for multiple comparisons of adjusted means (Winer, 1962).

Criterion Measures

The assessment of the reading achievement of the treatment groups was based upon two sets of measures. One set was given to all pupils who completed the 140 day experiment. A second set was administered to subsamples randomly drawn from each treatment group.

The first set consisted of three instruments that were used as criteria for the assessment of the silent reading achievement of the total treatment groups. Two criterion measures were originally proposed in the local study: the Philadelphia Reading Test, and A Reading Test Based upon Linguistic Principles. Only total raw scores were reported for these two tests, although, there were several subtests in each of these two criterion measures. An additional criterion measure was the Stanford Achievement Test consisting of five subtests: Word Reading, Paragraph Meaning, Vocabulary, Spelling, and Word Study Skills. This was the instrument agreed upon by the project directors of the twenty-seven research inves-

tigations supported by the Cooperative Research Program of the U. S. Office of Education. The three instruments mentioned above, yielding 7 scores, were administered to all subjects in the two treatment groups who completed the 140 day experimental period.

Five additional measures yielding 7 scores were administered to a subsample selected at random from each treatment group. (The subsample in each treatment consisted of 45 pupils). These measures included two creative writing samples and three oral reading measures: the Gilmore Oral Reading Test, Gates Word Pronunciation Test, the Fry Phonetically Regular Words Oral Reading Test. The oral reading tests were administered individually to pupils in the subsample; the writing sample was obtained from all pupils, but only the writing samples of those children who took the individual oral reading tests were analyzed.

The raw-score data for each of the criterion measures were subjected to an analysis of covariance of group means classified in a factorial design: 2 Treatments x 3 Ability Score Levels x 2 Sexes. The raw-score means were adjusted for initial differences of the six predictor variables that were discussed in the preceding section.

The data presented first are for the seven criterion measures for the 674 pupils in the two treatment groups for whom complete data were available. The seven criterion measures were:

Linguistic Reading Test

Philadelphia Reading Test

Stanford Word Reading Test

Stanford Paragraph Meaning Test

Stanford Vocabulary Test

Stanford Spelling Test

Stanford Word Study Skills Test

Analysis of Criterion Measures for Total Sample

The raw-score means for total treatments favored the basal reader group on six of the seven criteria. The linguistic group had a higher mean total score on the Linguistic Reading Test. All of these treatment differences between raw-score means were significant at the .01 level. As would be expected, there were significant differences (at the .01 level), between ability score levels, with the high ability score level achieving highest on all criteria, and the low ability score level scoring the lowest. The raw-score means for sexes favored the girls on six of the seven criteria. There were significant sex differences at the .05 level on the Stanford Word Reading subtest; and at the .01 level on the Linguistic Reading Test, the PRT, and the Stanford subtests for Paragraph Meaning, Spelling, and Word Study Skills. The linear component of treatment and ability score level interactions was

significant at the .01 level for the PRT, Stanford Paragraph Meaning and Vocabulary subtests. The quadratic component of these interactions was significant at the .05 level for the Linguistic Reading Test and the Stanford Spelling subtest and at the .01 level for the PRT and Stanford Vocabulary subtest. None of the other seven interactions was significant. The means, standard deviations, and analysis of variance of F values are shown in Appendices A through D.

When means were adjusted for initial differences on the six predictor variables, the differences among ability score level means and between treatment mean scores decreased. The analysis of covariance F ratios for the seven criterion variables are presented in Table 20. The sums of squares for ability score levels are broken down into linear components and quadratic components. The linear component is significant for all criteria, and the quadratic component is significant for five out of seven criteria.[1] The adjusted mean differences for total treatment groups continue to be

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[1]A significant linear component indicates that the succeeding ability score levels are associated with increasing adjusted mean scores on criterion measures, while a significant quadratic component indicates that for adjusted mean scores the size of the increase varies from one ability score level to the next.

Table 20

ANALYSIS OF COVARIANCE F RATIOS FOR SEVEN CRITERION VARIABLES

Source of Variation	Linguistic Reading Test	Phila. Reading Test	Stanford Subtests				
			Word Reading	Paragraph Meaning	Vocabulary	Spelling	Word Study Skills
Treatment (T)	176.13**	13.18**	1.96	9.63**	15.70**	25.72**	17.84**
Ability Score Level Linear (AL)	15.05**	7.38**	15.17**	23.00**	9.71**	15.39**	27.74**
Ability Score Level Quad (AQ)	4.41*	3.66	16.43**	45.65**	3.94*	.59	8.90**
Sex (S)	4.78*	6.84**	.65	9.78**	.00	5.86*	6.60*
T x AL	4.48*	.44	.00	16.81**	5.89*	.89	8.02**
T x AQ	53.15**	23.05**	11.99**	4.02*	4.49*	24.48**	10.49**
T x S	.45	.12	.53	.92	1.01	.85	.01
S x AL	.28	.07	.38	3.73	.01	.01	.14
S x AQ	.02	.19	.01	.34	3.65	1.28	.05
T x S x AL	.03	4.10*	.57	.02	.64	2.96	.28
T x S x AQ	3.58	.45	.66	2.05	.24	.13	.51

*Significant at .05 level.
**Significant at .01 level.
df = 1,656

significant at the .01 level, with differences favoring the linguistic group on the linguistic test, and favoring the basal reader group for five of the other six criterion measures. Total treatment differences were not significant for Stanford Word Reading.

The linguistic group achieved higher adjusted means on the Linguistic Reading Test.

On the whole, the basal reader group tended to achieve higher adjusted mean scores on the majority of the silent reading criteria studied, but this performance was not consistent at all ability score levels. Inconsistency results in significant treatment and ability score level interactions for all of the seven criterion measures. The combined effects of treatment and ability score levels produce results not predictable from the effects of the two separately. Differences between the adjusted means for treatments are sometimes large at one ability score level, and small, absent, or in the opposite direction at another ability score level. The sums of squares pertaining to interactions with ability are broken down into linear and quadratic components, as was the ability main effect mentioned above. A significant linear component is found for four of the criterion measures: the Linguistic Reading Test and three of the Stanford subtests (Paragraph Meaning, Vocabulary, and Word Study Skills). A

significant quadratic component is found for all seven criteria.[1]

On five of the seven criterion tests, the girls achieved significantly higher scores than the boys. These criteria included three of the Stanford subtests (Paragraph Meaning, Spelling, and Word Study Skills), the Philadelphia Reading Test total score, and the Linguistic Reading Test. The Stanford Spelling subtest, the Stanford Word Study Skills subtest, and the Linguistic Reading Test results were significant at the .05 level. The other differences were significant at the .01 level.

There were no significant interactions between sexes and treatments or between sexes and ability score levels. Among the three-way interactions, only the linear component for the PRT was significant, and that at the .05 level.

The results of the covariance analysis for each of the seven silent reading criterion measures, adjusted for the influence of the six relevant predictor variables, are presented separately below. The data for the Linguistic Reading Test are

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[1]A significant linear interaction of treatments and ability score levels indicates that there tends to be an increase in the size of the difference between treatment means from one ability score level to the next. The quadratic component indicates an irregular progression of differences in adjusted mean scores for treatments from one ability score level to another, so that a graph of the differences between means would show these differences in a curved line rather than in a straight line.

presented first, followed by data for the Philadelphia Reading Test, and for the five Stanford subtests.

Reading Test Based Upon Linguistic Principles

The Linguistic Reading Test was developed especially for this project by Mrs. Mildred K. Rudolph and Mrs. Rosemary G. Wilson, supervisor and consultant respectively for the linguistic treatment group. It consists of 48 items grouped into four subtests: word reading, phrase reading, sentence reading, and paragraph reading. The test was patterned after the Philadelphia Reading Test (PRT). The items included in each of the subtests were based upon spelling patterns and sentence patterns employed in the linguistic reading series used for instructional purposes.

Table 21 shows the adjusted score means for treatments, ability score levels, and sexes. The adjusted means are graphed in Figure 1.

There were significant differences for all main effects. The difference between adjusted means for treatments was significant at the .01 level and favored the linguistic group. Sex difference in adjusted means, significant at the .05 level, favored the girls. Adjusted means among ability score levels were significant at the .01 level for the linear component, and were significant at the .05 level for the quadratic component. The adjusted mean differences were not consistent from one ability score level to the other. The adjusted mean score for the basal reader treatment at the average ability score level was lower than the adjusted mean score for the low ability

Table 21

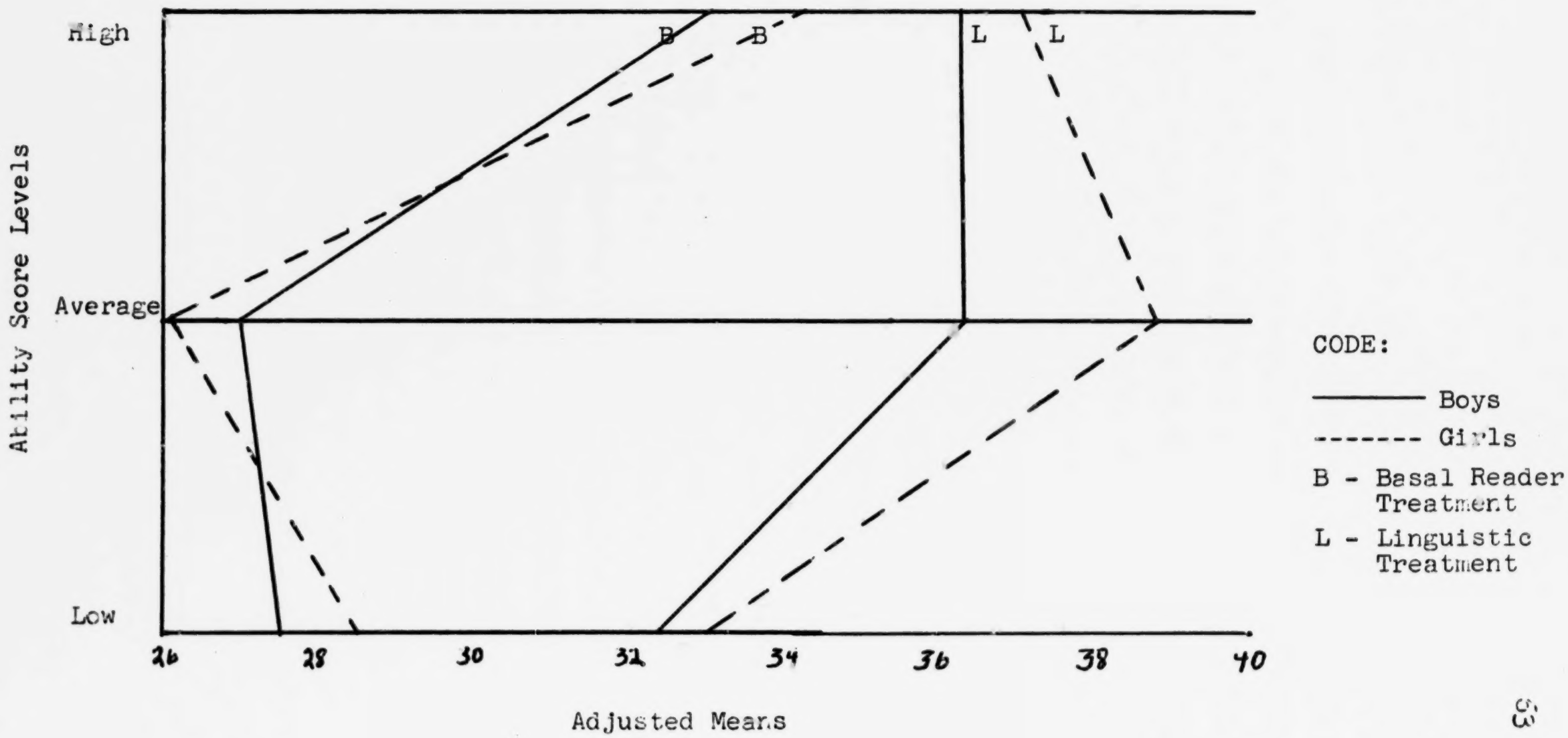
ADJUSTED MEANS FOR LINGUISTIC READING TEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	51	33.12		36.30	66			
	Girls	67	34.27		37.07	61			
	Cell Total	118	33.77	←.01→	36.67	127	245	35.27	
								↑ .01 ↓	
Average	Boys	69	26.97		36.35	64			
	Girls	58	26.13		38.82	55			
	Cell Total	127	26.58	←.01→	37.49	119	246	31.86	.01
								↑ .05 ↓	
Low	Boys	46	27.56		32.39	49			
	Girls	36	28.53		32.99	52			
	Cell Total	82	27.99	←.01→	32.70	101	183	30.59	
Total	Boys	166	29.02		35.24	179	345	32.25	.05
	Girls	161	30.05		36.38	168	329	33.28	
Total Treatment		327	29.53	←.01→	35.80	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 1

ADJUSTED MEANS FOR LINGUISTIC READING TEST



score level. The adjusted mean score for the average ability score level in the linguistic treatment was higher than the adjusted mean for the high ability score level. Significant interactions were found for both linear and quadratic components for treatments by ability score levels. The linear component of the treatment and ability score level interaction was significant at the .05 level, while the quadratic component was significant at the .01 level. When the adjusted treatment means at each of the three ability score levels were compared using the Newman-Keuls sequential range test, all differences favored the linguistic group, and were significant at the .01 level. Significant ability by treatment interaction appeared, although the linguistic treatment group was significantly superior at all ability score levels. The differences were by far the largest at the average level. For the linguistic group pupils at the high and average ability score levels scored near the ceiling of the test; pupils at the average and low ability score levels of the basal group scored near the floor of the test; the high ability level basal reader group and the low ability level linguistic group fell in between.

Philadelphia Reading Test

This criterion measure consisted of five subtests measuring word reading, phrase reading, sentence reading, paragraph reading, and reading to follow directions. There were 48 items in the test. Since all of the subtest scores correlated highly with the total test score for both treatments, only the total score was used as a criterion measure.

The adjusted score means for treatments, ability score

levels, and for sexes are shown in Table 22. The adjusted means are graphed in Figure 2.

For main effects, there were significant differences for treatments, sexes, and ability score levels (linear component). Adjusted mean differences for treatments, favoring the basal reader group, were significant at the .01 level. Differences in adjusted means for sex were significant at the .01 level, and favored the girls. The adjusted mean differences for ability score levels (linear component) were significant at the .01 level, with the high ability score level having the highest mean scores and the low ability score level having the lowest scores. Although this is true for the total ability score level means, it is not consistently true for the cell means, as shown in Table 22.

The interaction for treatments and ability score levels (quadratic component) was significant at the .01 level. The significant interaction for the quadratic component was characterized by superiority of the basal reader group at the high and low ability score levels that was significant at the .01 level and by a non-significant difference at the average ability score level.

Table 22

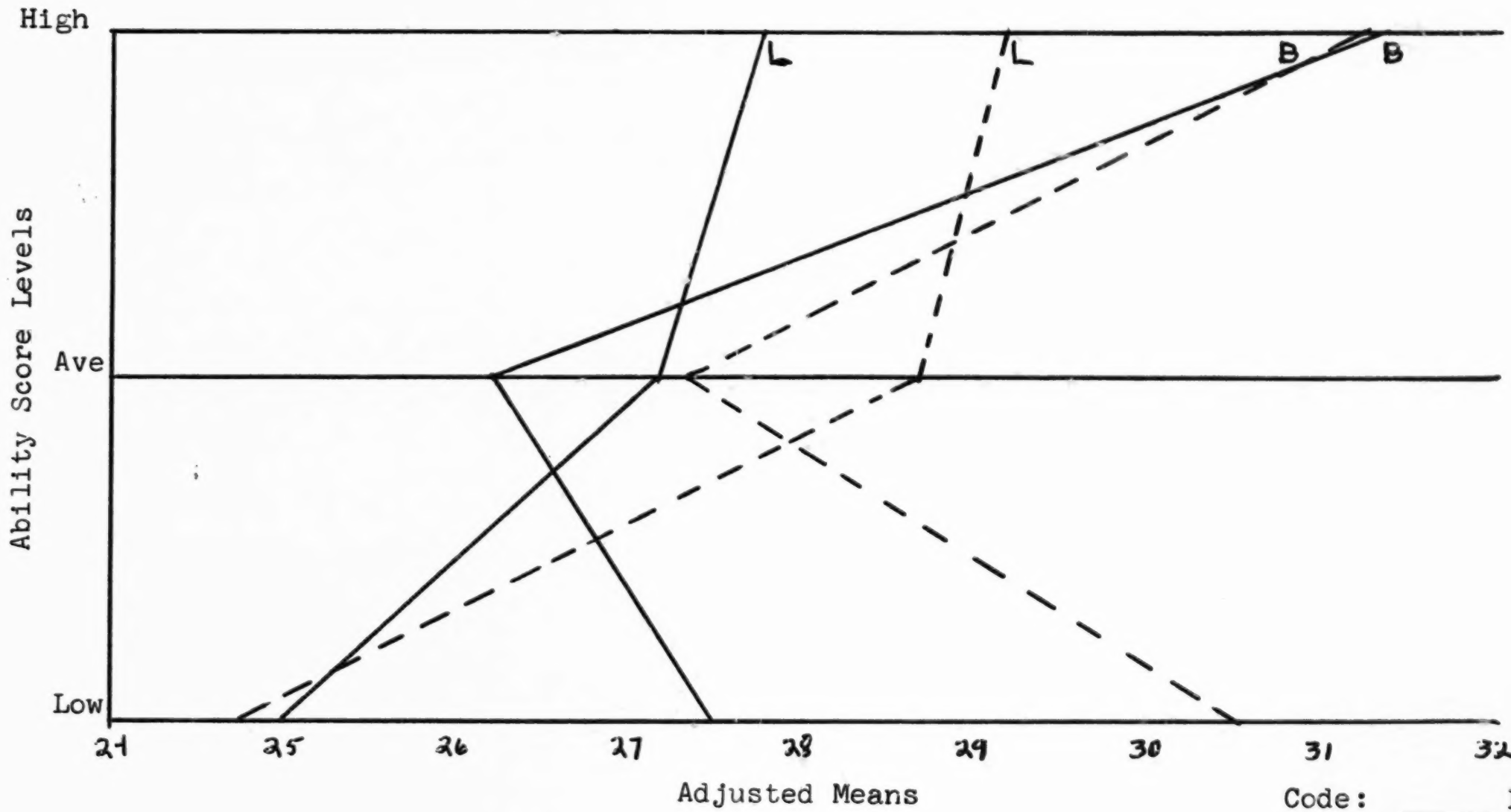
ADJUSTED MEANS FOR PHILADELPHIA READING TEST (PRT)

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	51	31.34		27.74	66			
	Girls	67	31.24		29.16	61			
	Cell Total	118	31.28	← .01 →	28.42	127	245	29.80	
								↑ .01	
Average	Boys	69	26.20		27.15	64			
	Girls	58	27.31		28.66	55			
	Cell Total	127	26.71	← NS →	27.91	119	246	27.26	.01
								↑ NS	
Low	Boys	46	27.47		24.98	49			
	Girls	36	30.50		24.75	52			
	Cell Total	82	28.80	← .01 →	24.86	101	183	26.63	
Total	Boys	166	28.13		26.77	179	345	27.43	.01
	Girls	161	29.66		27.63	168	329	28.62	
Total Treatment		327	28.88	← .01 —	27.19	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 2

ADJUSTED MEANS FOR PHILADELPHIA READING TEST



Code: _____ Boys

----- Girls

B - Basal Reader Treatment

L - Linguistic Treatment

Stanford Word Reading Subtest

This subtest consisted of thirty-five items each containing four words from which the subject selected the appropriate one. The word reading subtest measures the pupil's recognition of words without context.

Of the main effects, only the adjusted mean differences (for both linear and quadratic components) among ability score levels were significant. These differences were significant at the .01 level. (See Table 23 and Figure 3.) Although differences between treatments favored the basal reader group, they were small and non-significant. Among the first order interactions, the only significant F was for treatment and ability score level (quadratic component). This F was also significant at the .01 level. The significant quadratic interaction for ability score levels and treatments reflected differences between treatments favoring the basal reader group that were significant at the .05 level at the high and low ability score levels with non-significant differences between adjusted means at the average ability score level. Again the means for the low basal reader group exceeded those for the average ability score level.

Table 23

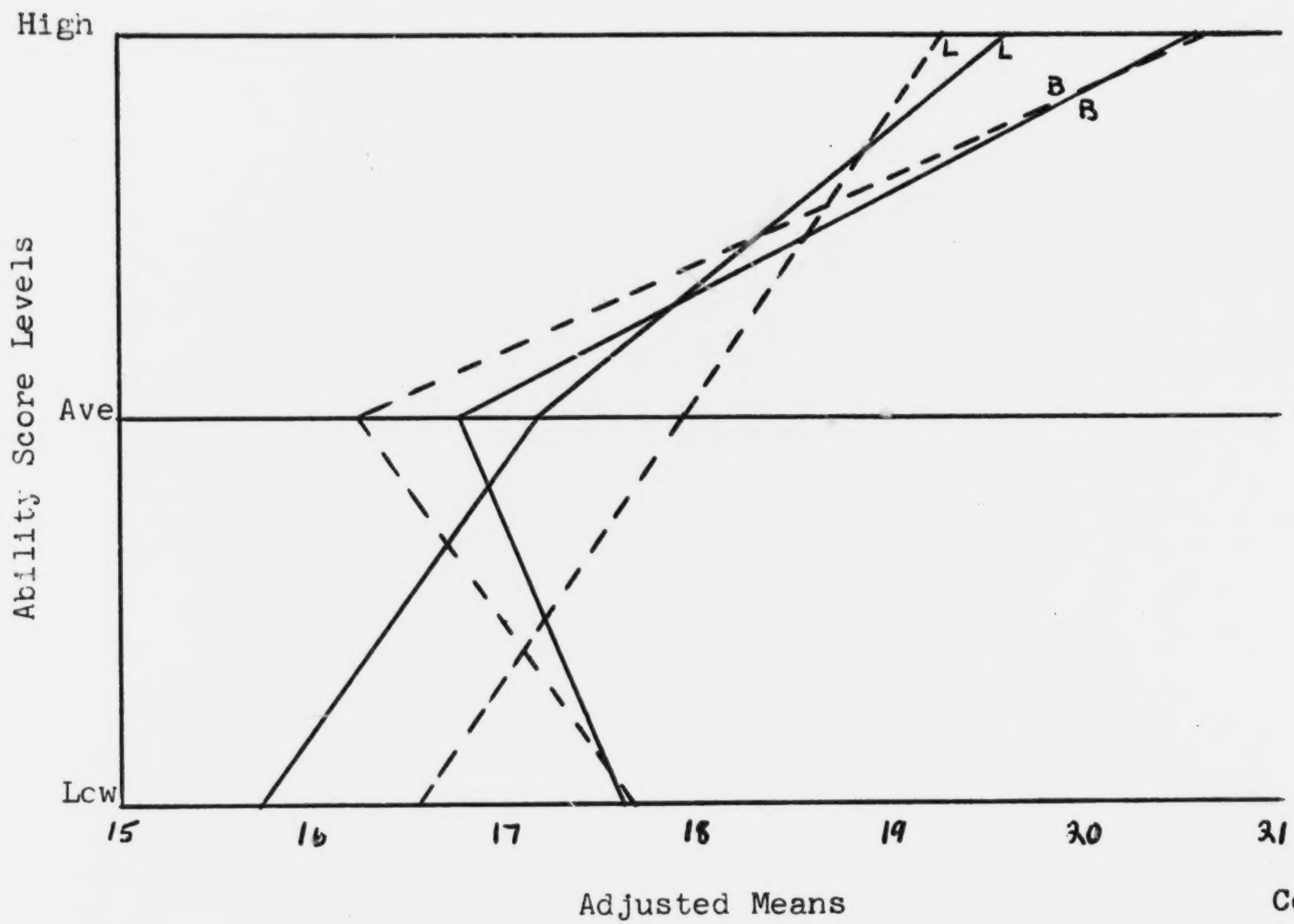
ADJUSTED MEANS FOR STANFORD WORD READING SUBTEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	51	20.57		19.58	66			
	Girls	67	20.60		19.25	61			
	Cell Total	118	20.59	←.05→	19.42	127	245	19.98	
								↑ .01 ↓	
Average	Boys	69	16.78		17.16	64			
	Girls	58	16.23		17.91	55			
	Cell Total	127	16.53	←NS→	17.51	119	246	16.93	.01
								↑ NS ↓	
Low	Boys	46	17.59		15.71	49			
	Girls	36	17.66		16.55	52			
	Cell Total	82	17.62	←.05→	16.14	101	183	16.80	
Total	Boys	166	18.17		17.66	179	345	17.90	NS
	Girls	161	18.34		17.85	168	329	18.18	
Total Treatment		327	18.27	←NS→	17.80	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 3

ADJUSTED MEANS FOR STANFORD WORD READING SUBTEST



Code:

——— Boys

----- Girls

B - Basal Reader Treatment

L - Linguistic Treatment

Stanford Paragraph Reading Subtest

There were thirty-eight paragraphs in this subtest, ranging from one to six sentences each, which were designed for evaluation of pupil comprehension of reading materials in context. One word was omitted in each paragraph and subjects were required to select one of four words to complete the paragraph.

Among the main effects, there were significant adjusted mean differences at the .01 level between treatments, among ability score levels, and between sexes. (See Table 24 and Figure 4.) There were reversals in the total means for ability score levels as well as reversals among cell means for ability score levels. Among the first order interactions, the linear component for the treatment and ability score level interaction was significant at the .01 level, and the quadratic component for the treatment and ability score level interaction was significant at the .05 level.

Examination of the adjusted means in Table 24 shows that the significant differences between treatment groups favored the basal reader group. These differences, however, were not consistent at all ability score levels, as shown by significant interactions. The significant interaction between treatments and ability score levels was characterized by superior performance of the basal reader group at the high ability score level significant at the .01 level, when the means were adjusted for the influence of the six covariates. The adjusted mean differences at the average and low ability score levels were not significant.

The presence of significant differences between adjusted means for sexes, without ability score level and sex or treat-

Table 24

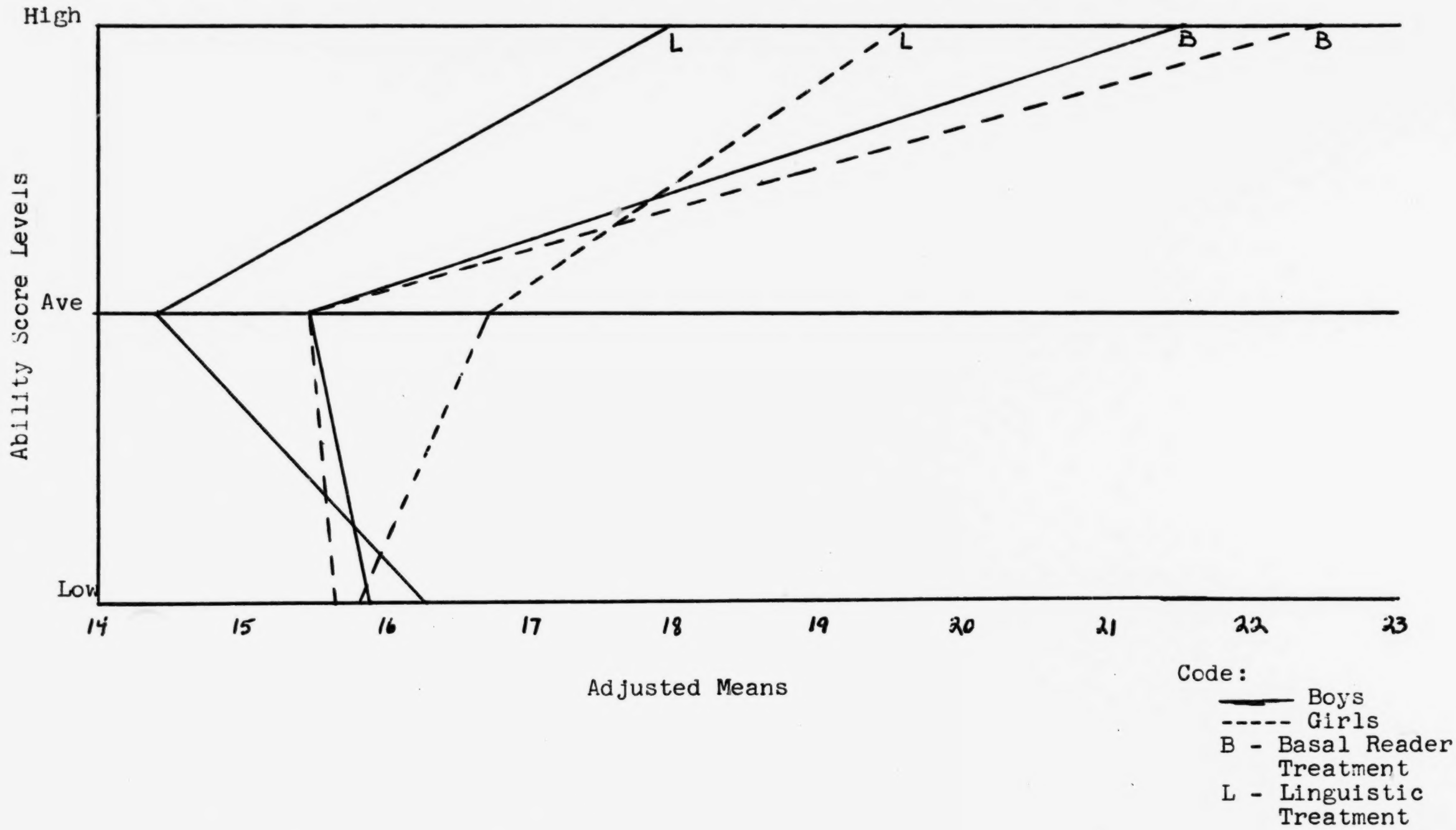
ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING SUBTEST

		Treatments							
		Basal Reader Approach			Linguistic Approach		Total		
Ability Score Level	Sex	N	Mean		Mean	N	N	Mean	
High	Boys	51	21.49		17.95	66			
	Girls	67	22.74		19.54	61			
	Cell Total	118	22.14	← .01 →	18.71	127	245	20.39	
Average	Boys	69	15.44		14.39	64		.01	
	Girls	58	15.46		16.70	55			
	Cell Total	127	15.45	← NS →	15.46	119	246	15.45	.01
Low	Boys	46	15.88		16.28	49		NS	
	Girls	36	15.63		15.82	52			
	Cell Total	82	15.77	← NS →	16.04	101	183	15.92	
Total	Boys	166	17.42		16.22	179	345	16.80	.01
	Girls	161	18.53		17.46	168	329	17.98	
Total Treatment		327	17.97	← .01 →	16.82	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 4

ADJUSTED MEANS FOR STANFORD PARAGRAPH MEANING SUBTEST



ment and sex interactions, indicate that the girls performed significantly better than the boys in paragraph comprehension.

Stanford Vocabulary Subtest

This Vocabulary subtest, which consisted of thirty-nine items, was a measure of listening vocabulary, since the items including the alternative responses were read by the examiner.

The difference between adjusted means for treatment groups was significant at the .01 level and favored the basal reader groups. (See Table 25 and Figure 5.) Among ability score levels, the adjusted mean differences were significant at the .01 level for the linear component and at the .05 level for the quadratic component.

The only significant interactions were for treatment and ability score levels. Both the linear and quadratic components of the interaction were significant at the .05 level.

Inspection of the adjusted means shown in Table 25 and graphed in Figure 5 show an interaction between treatments and ability score levels, or a lack of consistency in mean differences from level to level. There are reversals in cell means for ability score levels between the average and low ability score level in the linguistic approach. The significant interaction was characterized by superiority of the basal reader group at the high and average ability score levels, while there was little difference at the low ability score level. The comparison of pairs of adjusted means by the sequential range test indicated that the differences between treatments for the high and average ability score levels were significant at the .01 level, and favored the basal reader treatment in both

Table 25

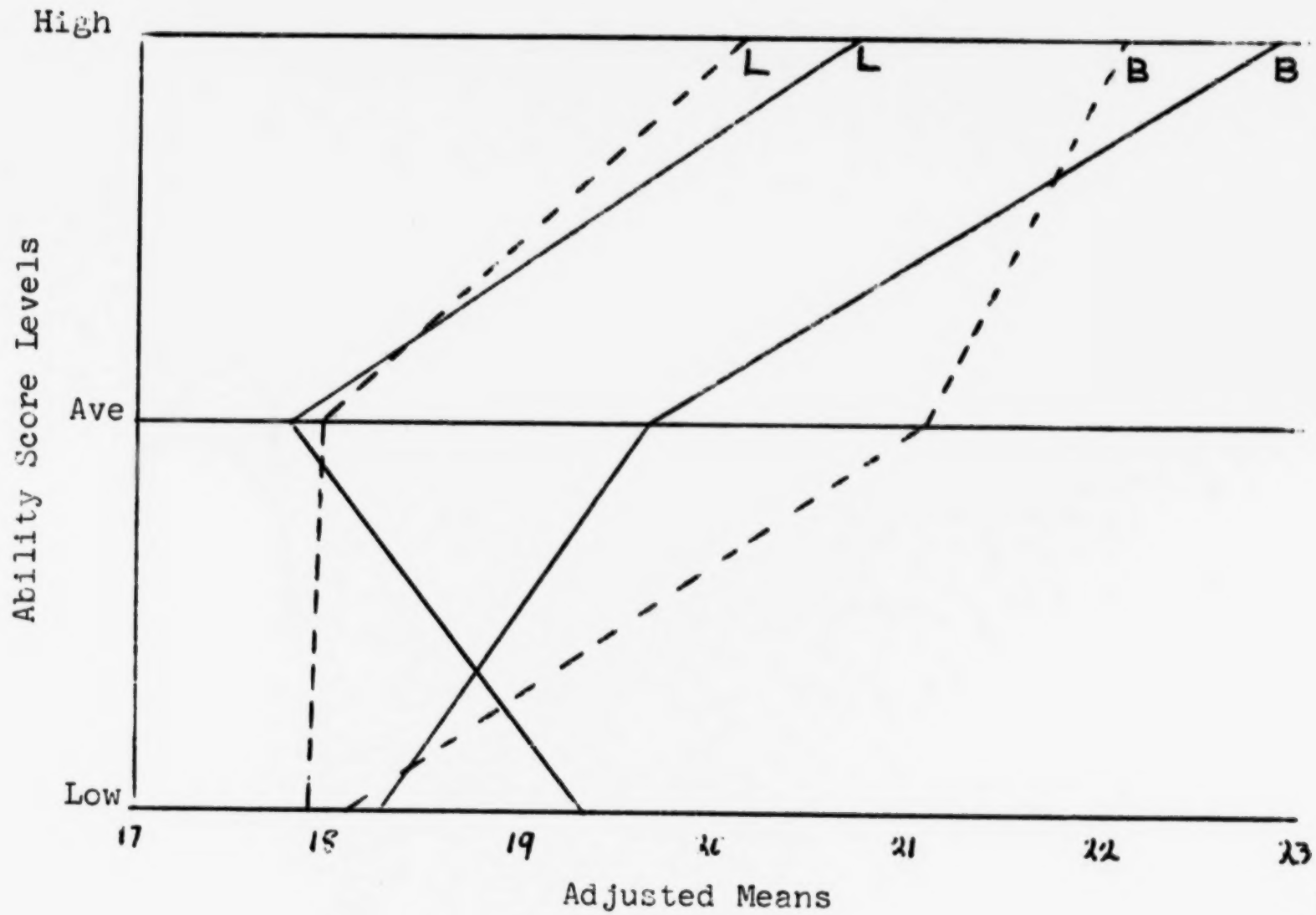
ADJUSTED MEANS FOR STANFORD VOCABULARY SUBTEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	51	22.84		20.69	66			
	Girls	67	22.06		20.11	61			
	Cell Total	118	22.43	←.01→	20.41	127	245	21.37	
								↑ .01 ↓	
Average	Boys	69	19.63		17.80	64			
	Girls	58	21.06		17.95	55			
	Cell Total	127	20.28	←.01→	17.88	119	246	19.12	.01
								↑ NS ↓	
Low	Boys	46	18.28		19.31	49			
	Girls	36	18.10		17.91	52			
	Cell Total	82	18.20	←NS→	18.59	101	183	18.42	
Total	Boys	166	20.24		19.27	179	345	19.74	NS
	Girls	161	20.81		18.70	168	329	19.75	
Total Treatment		327	20.52	←.01→	19.01	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 5

ADJUSTED MEANS FOR STANFORD VOCABULARY SUBTEST



Code:

_____ Boys
----- Girls
B - Basal Reader Treatment
L - Linguistic Treatment

instances. At the low ability score level, the difference was not significant.

Stanford Spelling Subtest

This twenty-nine item subtest consisted of words that were found frequently in the writing of children at the primary level. The words were dictated by the examiner who then read an illustrative sentence, repeated the word, and allowed pupils to write the word in the test booklet.

Differences between adjusted means for treatments and for ability score levels (linear component) were significant at the .01 level. (See Table 26 and Figure 6.) The significant treatment differences favored the basal reader group, and the significant ability score level differences favored the high ability score level, but only for total ability score levels. Adjusted mean differences for sex were significant at the .05 level and favored the girls.

The quadratic component of the interaction between treatment and ability score level was significant at .01 level. The curvilinear nature of the progression of the difference in adjusted mean scores for treatment from one ability score level to another is indicated in Figure 6. The significant interaction between treatments and ability score levels, when the means on the Spelling test are adjusted, is characterized by superior performance significant at the .01 level, of the basal reader group at the high and low ability score levels, while the difference at the average ability score level is not significant.

Table 26

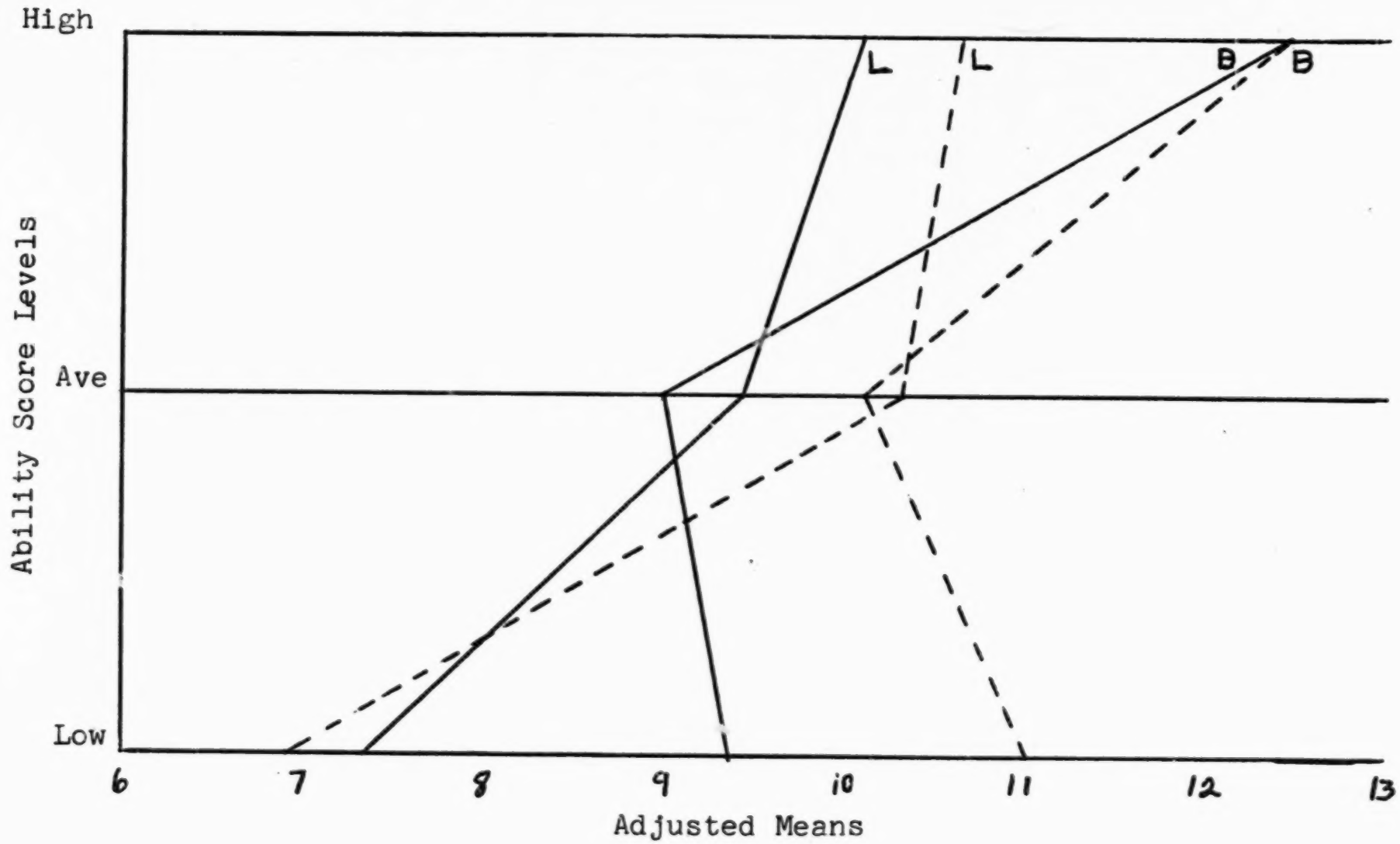
ADJUSTED MEANS FOR STANFORD SPELLING SUBTEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
Hign	Boys	51	12.47		10.09	66			
	Girls	67	12.47		10.63	61			
	Cell Total	118	12.47	←.01→	10.35	127	245	11.37	
								↑	
Average	Boys	69	8.99		9.46	64		.01	
	Girls	58	10.11		10.31	55		↓	
	Cell Total	127	9.50	← NS →	9.89	119	246	9.67	.01
								↑	
Low	Boys	46	9.47		7.33	49		.01	
	Girls	36	11.01		6.92	52		↓	
	Cell Total	82	10.15	←.01→	7.12	101	183	8.48	
Total	Boys	166	10.19		9.10	179	345	9.63	
	Girls	161	11.29		9.38	168	329	10.32	.05
Total Treatment		327	10.73	←.01→	9.24	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 6

ADJUSTED MEANS FOR STANFORD SPELLING SUBTEST



Code:

_____ Boys

----- Girls

B - Basal Reader Treatment

L - Linguistic Treatment

Stanford Word Study Skills Subtest

This subtest consists of 56 items distributed as follows: 14 items for determining initial consonant sounds, 14 items for determining final consonant sounds, 14 items on matching a word heard with one of three choices that are read, and 14 items for recognizing rhyming words.

All adjusted mean differences for main effects were significant. (See Table 27 and Figure 7.) Adjusted mean differences for treatments were significant at the .01 level, favoring the basal reader group. The adjusted mean differences among ability score levels were significant at the .01 level for both the linear and quadratic components, with the differences progressing from low to high ability score levels, again only for total ability score levels. Adjusted mean differences for sex were significant at the .05 level, with the girls having the higher mean scores.

Interactions of treatments and ability score levels, both linear and quadratic components, were significant at the .01 level. These significant interactions were characterized by superiority of the basal reader group at the low ability score level, significant at the .01 level, no significant difference at the average ability score level, and significant differences at the .05 level favoring the basal group at the high ability score level.

Table 27

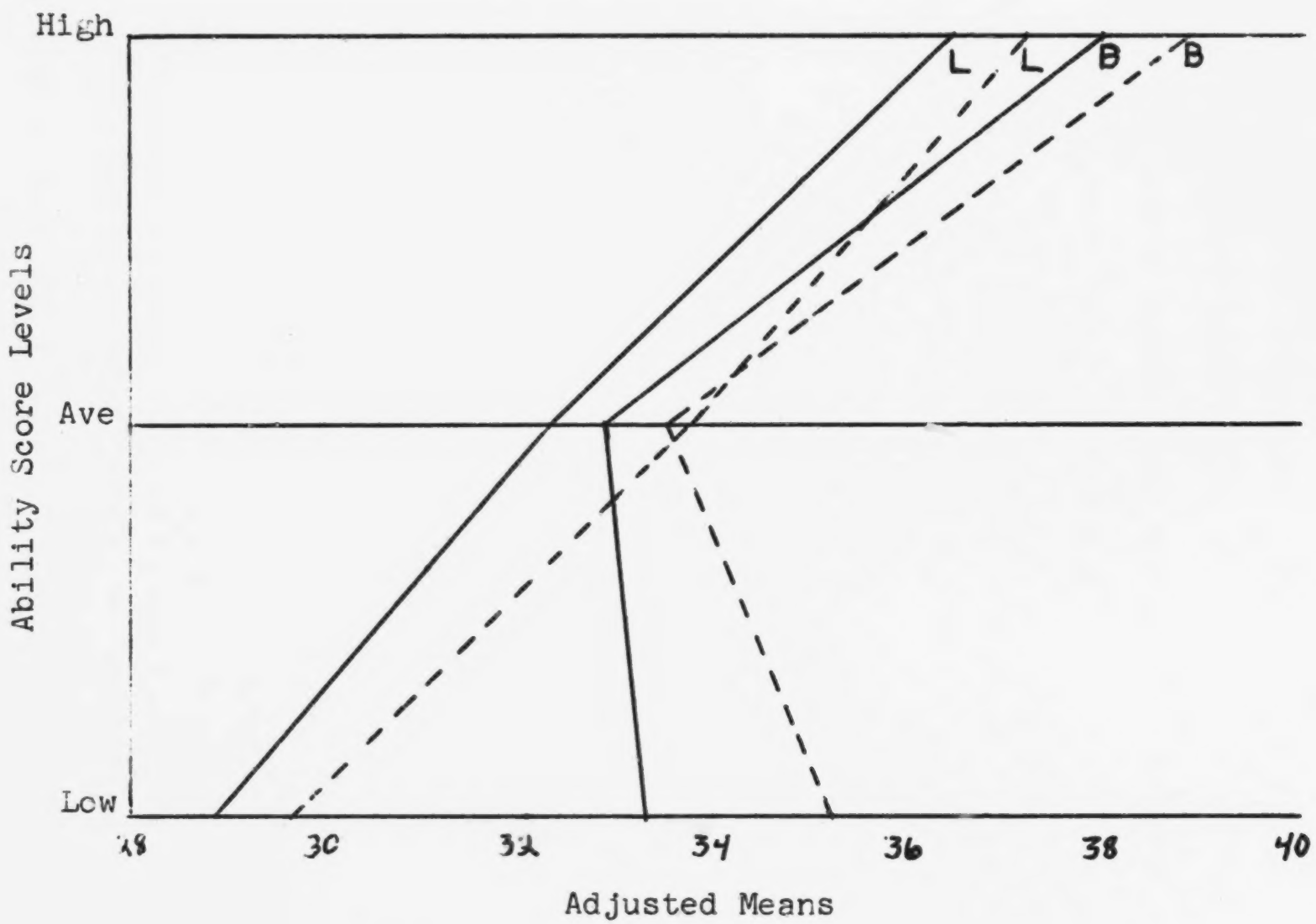
ADJUSTED MEANS FOR STANFORD WORD STUDY SKILLS SUBTEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	51	37.98		36.42	66			
	Girls	67	38.57		37.22	61			
	Cell Total	118	38.29	← .05 →	36.80	127	245	37.53	←
								↑ .01 ↓	
Average	Boys	69	32.85		32.26	64			
	Girls	58	33.58		33.75	55			
	Cell Total	127	33.14	← NS →	33.01	119	246	33.05	.01
								↑ .01 ↓	
Low	Boys	46	33.31		28.86	49			
	Girls	36	35.23		29.64	52			
	Cell Total	82	34.15	← .01 →	29.26		183	31.45	←
Total	Boys	166	34.55		32.86	179	345	33.68	←
	Girls	161	35.99		37.74	168	329	34.84	← .05
Total Treatment		327	35.26	← .01 →	33.29	347			

Significance levels corresponding to F's shown on Table 20 are indicated by arrows for selected comparisons.

Figure 7

ADJUSTED MEANS FOR STANFORD WORD STUDY SKILLS SUBTEST



Code:

_____ Boys

----- Girls

B - Basal Reader Treatment

L - Linguistic Treatment

San Diego Pupil Attitude Inventory

The San Diego Inventory was one of the posttest measures agreed upon by the directors of the cooperative first grade reading studies. This test consisted of 25 questions about reading preferences and interests. The questions were read by the examiner, and the pupils responded with "yes" or "no" answers. The score was the number of responses indicating a positive attitude. The means and standard deviations on the Inventory for treatment groups, ability score levels, and sexes are presented in Table 28.

Table 28

MEANS AND STANDARD DEVIATIONS FOR SAN DIEGO PUPIL ATTITUDE INVENTORY

Group	Mean	Standard Deviation
High Basal Boys	18.63	3.20
High Linguistic Boys	18.49	4.04
High Basal Girls	19.37	3.77
High Linguistic Girls	20.46	3.54
Average Basal Boys	16.09	4.20
Average Linguistic Boys	17.45	3.51
Average Basal Girls	15.67	2.79
Average Linguistic Girls	18.62	2.76
Low Basal Boys	20.00	9.43
Low Linguistic Boys	16.86	4.61
Low Basal Girls	17.78	3.80
Low Linguistic Girls	16.35	3.56
Totals		
Basal Reader	17.82	4.40
Linguistic	18.11	3.66

The analysis of variance *F* values are shown in Table 29. Although the children in the linguistic approach had the higher mean score, the mean differences between treatments were not

Table 29

ANALYSIS OF VARIANCE F RATIOS FOR SAN DIEGO PUPIL ATTITUDE INVENTORY

Source of Variation	df	F Ratio
Treatment (T)	1,663	.10
Ability Score Level (A)	2,663	17.27**
Sex (S)	1,663	.15
T x A	2,663	13.90**
T x S	1,663	5.10*
A x S	2,663	5.30**
T x A x S	2,663	.04

*Significant at .05 level.
**Significant at .01 level.

significant. Differences in means among ability score levels were significant at the .01 level. The significant interactions between treatment and ability score level, between treatment and sex, and between ability score level and sex, indicate that differences were not consistent.

Analysis of Criterion Measures for Subsamples

Oral Reading Tests

Three measures of oral reading were administered individually to a random sample of pupils in each treatment group. A table of random numbers was used to select pupils from among the three ability score levels in each treatment group. While

the original random sample drawn from each treatment numbered 45 pupils, a few pupils in each treatment did not complete all of the measures administered to this small sample group. Data were analyzed for 77 pupils for whom complete data were available. There were 36 pupils in the basal reader treatment and 41 pupils in the linguistic treatment. The three oral reading measures that were administered to pupils were:

Gilmore Oral Reading Test (yielding accuracy and rate scores)

Fry Phonetically Regular Words Oral Reading Test

Gates Word Pronunciation Test

The Gilmore Oral Reading Test consisted of a series of paragraphs contained in a test booklet, which the pupil read aloud as the examiner recorded errors the pupil committed. Following directions in the manual, the total accuracy score for each student was the number of paragraphs he was able to read without committing more than 10 errors per paragraph. This raw score was converted into a grade-level score for accuracy of oral reading by use of a table in the test manual. A rate of oral reading-score was also computed for each pupil. The rate score in words read per minute was based on the paragraphs that the pupil read orally while committing no more than 10 but no less than 2 errors per paragraph.

The Fry Phonetically Regular Words Oral Reading Test consisted of 30 words in which the words became increasingly more difficult. The total raw score was the number of words read aloud correctly from the list. The Fry test was designed to provide a measure of recognition of the type of regular words generally found in reading materials using the linguistic

approach.

The Gates Word Pronunciation Test contained 40 words increasing in difficulty typical of those generally presented as sight words in the basal reader programs. The total raw score was the number of words read aloud correctly from the list.

The raw-score means for total treatments favored the basal reader group on all three of the oral reading measures. The raw-mean differences between treatments were significant at the .01 level for the Gilmore test (both accuracy and rate scores), and for the Gates test; the differences for the Fry test were significant at the .05 level. Differences among ability score levels were significant at the .01 level, with the high ability score level having the highest mean, and the low ability score level having the lowest mean. Sex differences favoring the girls were significant at the .01 level.

The raw-score means and standard deviations for the subsample variables (oral reading tests and writing samples) were not reported as part of the computer program for analyzing the subsample data. Only the analysis of variance *F* ratios were reported. These are shown in Appendix F. Since it was the adjusted means that were to be interpreted, procedures for retrieving the raw-score means and standard deviations were not followed.

When means were adjusted for initial differences on the six pretest variables, the differences among ability score level mean scores and between treatment mean scores decreased. Tables 30, 31, 32, and 33, show adjusted means for oral reading tests. Table 34 presents the analysis of covariance *F* ratios. The sum of squares for ability score levels was broken down into

Table 30

ADJUSTED MEANS FOR GILMORE ORAL READING TEST, ACCURACY

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	30.55	16.18	3			
	Girls	9	30.82	25.59	12			
	Cell Total	14	30.72	23.71	15	29	27.09	
Average	Boys	6	21.01	16.20	7			
	Girls	4	22.84	25.70	7			
	Cell Total	10	21.74	20.95	14	24	21.28	NS
Low	Boys	6	19.73	19.56	6			
	Girls	6	22.45	17.53	6			
	Cell Total	12	21.09	18.54	12	24	19.82	
Total	Boys	17	23.36	17.46	16	33	20.50	NS
	Girls	19	26.50	24.69	25	44	24.90	
Total Treatment		36	25.01 ← NS →	21.26	41			

Significance levels corresponding to F's shown on Table 34 are indicated by arrows for selected comparisons.

Table 31

ADJUSTED MEANS FOR GILMORE ORAL READING TEST, RATE[a]

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	91.70	49.10	3			
	Girls	9	71.52	65.65	12			
	Cell Total	14	78.73	62.34	15	29	70.25	
Average	Boys	6	49.23	31.93	7			
	Girls	4	56.05	70.05	7			
	Cell Total	10	51.96	50.99	14	24	51.39	NS
Low	Boys	6	54.81	36.01	6			
	Girls	6	57.83	29.19	6			
	Cell Total	12	56.34	32.60	12	24	44.47	
Total	Boys	17	63.69	36.66	16	33	50.59	NS
	Girls	19	63.96	58.13	25	44	60.65	
Total Treatment		36	63.83 ← .05 →	49.76	41			

Significance levels corresponding to *F*'s shown in Table 34 are indicated by arrows for selected comparisons.

Table 32

ADJUSTED MEANS FOR GATES WORD PRONUNCIATION TEST

Adjusted Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	14.24	12.87	3			
	Girls	9	14.54	13.84	12			
	Cell Total	14	14.43	13.65	15	29	14.03	
Average	Boys	6	9.72	7.55	7			
	Girls	4	7.65	11.40	7			
	Cell Total	10	8.89	9.48	14	24	9.23	NS
Low	Boys	6	10.71	9.57	6			
	Girls	6	9.80	6.71	6			
	Cell Total	12	10.26	8.14	12	24	9.20	
Total	Boys	17	11.40	9.30	16	33	10.38	NS
	Girls	19	11.59	11.45	25	44	11.51	
Total Treatment		36	11.50 ← NS →	10.61	41			

Significance levels corresponding to F's shown in Table 34 are indicated by arrows for selected comparisons.

Table 33

ADJUSTED MEANS FOR FRY PHONETICALLY REGULAR WORDS ORAL READING TEST

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	10.12	5.99	3			
	Girls	9	9.79	8.48	12			
	Cell Total	14	9.91	7.98	15	29	8.91	
Average	Boys	6	4.92	5.53	7			
	Girls	4	3.42	9.10	7			
	Cell Total	10	4.32	7.23	14	24	6.07	NS
Low	Boys	6	4.97	7.02	6			
	Girls	6	4.72	5.47	6			
	Cell Total	12	4.84	6.24	12	24	5.54	
Total	Boys	17	6.47	6.18	16	33	6.32	NS
	Girls	19	6.85	7.93	25	44	7.46	
Total Treatment		36	6.67 ← NS →	7.25	41			

Significance levels corresponding to F's shown in Table 34 are indicated by arrows for selected comparisons.

Table 34

ANALYSIS OF COVARIANCE F RATIOS FOR ORAL READING TESTS

Source of Variation	Gilmore Accuracy	Gilmore Rate	Fry	Gates
Treatment (T)	2.78	4.42*	.37	.42
Ability Linear (AL)	1.22	2.05	1.89	2.59
Ability Quadratic (AQ)	.38	.42	.98	2.90
Sex (S)	2.68	1.69	1.12	.69
T x AL	1.20	.05	3.27	.10
T x AQ	.73	1.76	3.03	.72
T x S	.20	1.42	.22	.29
S x AL	.30	.02	.31	.73
S x AQ	.91	4.34*	1.02	.77
T x S x AL	1.53	2.08	.87	.24
T x S x AQ	.25	.32	.97	1.39

*Significant at .05 level.
df - 1,59.

a linear and a quadratic component. None of the differences for the linear or quadratic component was significant for any of the three criterion measures. The only significant differences between total treatments was for rate of oral reading on the Gilmore test. This difference was significant at the .05 level and favored the basal reader group. Differences between adjusted means for sex on the three oral reading measures were not significant. There was only one significant interaction; this interaction was for the sex and quadratic component of ability score level for the Gilmore oral reading rate.

Evaluation of Writing Samples

In addition to the assessment of silent and oral reading achievement, creative writing skills of the subsample from each treatment group were evaluated. Since the writing of sentences and compositions was basic to the Fries linguistic approach employed in the present investigation, it was of interest to analyze the restricted writing samples collected from the 77 pupils in the subsample group. (See Appendix H for directions and scoring procedures.) Only the data for the restricted writing sample were analyzed.

Pupils were directed to write a story and a minimum amount of motivation was supplied by the teacher. Assistance in spelling was not provided by the teacher. Twenty minutes were allowed for the writing.

The writing samples were analyzed in terms of three factors: a mechanics-ratio score, which provided data pertaining to puncutation, capitalization, and paragraphing sense; a total score for number of words spelled correctly; and a fluency score based upon the total number of words contained in each story.

The raw-score means for treatments for all three writing sample criteria favored the linguistic group. However, only the treatment mean differences for mechanics-ratio score was significant, and that at the .05 level. All of the differences among raw-score means for the linear component of ability score levels were significant at the .01 level. None of the differences between raw-score means of the quadratic component of ability score levels was significant. There were significant differences between the raw-score means for sexes, favor-

ing the girls on spelling and number of running words. Only one of the interactions was significant. The raw-score means and standard deviations were not reported in the computer analysis of subsample data. The F ratios are shown in Appendix F.

When the raw-score means were adjusted for the influence of the six predictor variables, there were significant differences between adjusted means for treatments at the .01 level in favor of the linguistic group for all three scores on the writing sample (mechanics-ratio, number of words spelled correctly, and total number of words written). The adjusted means are presented in Tables 35, 36, and 37. The analysis of covariance F ratios are shown in Table 38. The sum of squares for ability score levels was broken down into linear and quadratic components. None of the differences among the adjusted means for ability score levels for either the linear or quadratic components was significant. Sex differences between the adjusted means were significant only for the mechanics-ratio score; the difference was significant at the .05 level and was in favor of the boys. There were no significant interactions.

Table 35

ADJUSTED MEANS FOR RESTRICTED WRITING SAMPLE, MECHANICS-RATIO

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	53.98	53.14	3			
	Girls	9	44.73	61.85	12			
	Cell Total	14	48.03	60.11	15	29	54.28	
Average	Boys	6	66.70	87.34	7			
	Girls	4	48.77	71.26	7			
	Cell Total	10	59.53	79.30	14	24	71.06	NS
Low	Boys	6	71.34	77.57	6			
	Girls	6	56.06	72.76	6			
	Cell Total	12	63.70	75.16	12	24	69.43	
Total	Boys	17	64.60	77.26	16	33	70.74	.05
	Girls	19	49.16	67.10	25	44	59.35	
Total Treatment		36	56.48 ← .01 →	71.07	41			

Significance levels corresponding to F's shown in Table 38 are indicated by arrows for selected comparisons.

Table 36

ADJUSTED MEANS FOR RESTRICTED WRITING SAMPLE, NUMBER OF WORDS SPELLED CORRECTLY

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean		Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	11.71		37.46	3			
	Girls	9	23.06		38.31	12			
	Cell Total	14	19.01		38.14	15	29	28.90	
Average	Boys	6	20.51		28.19	7			
	Girla	4	7.62		51.03	7			
	Cell Total	10	15.35		40.13	14	24	29.51	NS
Low	Boys	6	28.69		32.78	6			
	Girls	6	25.65		27.82	6			
	Cell Total	12	27.17		30.30	12	24	28.74	
Total	Boys	17	20.81		32.08	16	33	26.06	NS
	Girls	19	20.63		39.36	25	44	31.27	
Total Treatment		36	20.71	.01	36.35	41			

Significance levels corresponding to F's shown on Table 38 are indicated by arrows for selected comparisons.

Table 37

ADJUSTED MEANS FOR RESTRICTED WRITING SAMPLE, TOTAL NUMBER OF RUNNING WORDS

Ability Score Level	Sex	Treatments: Basal Reader Approach N	Basal Reader Approach Mean	Linguistic Approach Mean	Linguistic Approach N	Total N	Total Mean	
High	Boys	5	14.45	41.32	3			
	Girls	9	28.04	43.49	12			
	Cell Total	14	23.19	43.06	15	29	33.46	
Average	Boys	6	22.39	32.82	7			
	Girls	4	15.37	56.30	7			
	Cell Total	10	19.58	44.56	14	24	34.15	NS
Low	Boys	6	28.10	33.98	6			
	Girls	6	29.53	29.36	6			
	Cell Total	12	28.82	31.67	12	24	30.24	
Total	Boys	17	22.07	34.85	16	33	28.27	NS
	Girls	19	25.84	44.69	25	44	35.98	
Total Treatment		36	24.06 ←—.01—→	40.24	41			

Significance levels corresponding to F's shown on Table 38 are indicated by arrows for selected comparisons.

Table 38

ANALYSIS OF COVARIANCE F RATIOS FOR RESTRICTED WRITING SAMPLE (RWS)

Source of Variation	RWS Mech. Ratio	RWS Spelling	RWS Running Words
Treatment (T)	10.07**	8.71**	8.43**
Ability Linear (AL)	1.31	.00	.01
Ability Quadratic (AQ)	2.14	.09	.33
Sex (S)	4.61*	.89	1.68
T x AL	.02	1.00	1.40
T x AQ	1.26	1.48	1.53
T x S	.73	.46	.19
S x AL	.47	.69	.75
S x AQ	1.07	.40	.54
T x S x AL	.10	.05	.03
T x S x AQ	.33	3.20	2.61

*Significant at .05 level.
**Significant at .01 level.
df - 1,59.

Comparing Variables that Differentiate High and Low Achieving Pupils in the Two Approaches

The minor objective of this study was to compare the variables that distinguish between high and low achievers in the linguistic group with the variables that distinguish between high and low achievers in the basal reader group. The median of seven correlations between each predictor variable and each of the criterion measures given to the total sample was computed for each treatment group and is presented in Table 39.

Table 39

MEDIAN OF THE WITHIN TREATMENT COEFFICIENTS OF CORRELATION FOR THIRTEEN PREDICTOR VARIABLES AND SEVEN CRITERION VARIABLES

Pretest Variables	Basal Reader Approach	Linguistic Approach
	Pupil Variables	
Pupil Chronological Age	.02	.03
Murphy-Durrell Phonemes	.71	.73
Murphy-Durrell Letter Names	.82	.78
Murphy-Durrell Learning Rate	.62	.55
Metropolitan Readiness Total Raw Score	.85	.83
Pintner-Cunningham Total Raw Score	.81	.75
Preschool Experience	.48	.41
Pupil Absence	-.19	-.09
	Teacher Variables	
Teacher Age	.08	.50
Total Years of Teaching Experience	.33	.19
Total Years of Teaching 1st Grade	.32	.13
Teacher Absence	-.13	.01
Principal's Rating of Teacher	.34	-.04

For only one of the eight correlations for pupil variables was the difference between treatment groups significant at the .05 level. This variable was the Pintner-Cunningham total raw score.

For four of the five correlations for teacher variables, there were significant differences at the .05 level between treatment groups. The difference between correlations for teacher absence and criterion variables narrowly missed significance at the .05 level. For teacher age, the correlation was higher for the linguistic group. The remaining four variables were more highly related to achievement in the basal reading group.

A summary of the results of the analysis contained in this chapter and a discussion of the results are presented in Chapter IV.

CHAPTER IV

SUMMARY, CONCLUSION, AND DISCUSSION

This is a progress report describing the first year of a three-year investigation comparing two approaches to teaching reading to children at three ability score levels. The research project is one of 27 cooperative studies of first-grade reading supported by the U. S. Office of Education. When this research project was initially proposed, it was hoped that the pupils could be followed for at least three years, with further assessment of achievement at the end of the second and third grades. This desire has been fulfilled, and the U. S. Office of Education is supporting a two-year follow-up study of the children who were studied in first grade. Pupils in the follow-up investigation are now well into the second grade and will be followed through the third grade.

The major objective of the present investigation was to compare the relative effectiveness of two approaches to the teaching of reading to children at three ability score levels. The two approaches were: (1) the Fries linguistic approach; and (2) the Scott, Foresman basal reader approach. Pupils were grouped at three ability score levels (high, average, and low) on the basis of results from the Philadelphia Verbal Ability

Test (PVA) that was administered to all pupils before the instructional period began.

A minor objective of the study was to compare the variables that differentiate between high and low achievers in one approach with variables that differentiate between high and low achievers in the second approach.

Procedures

Population

One class in each of 24 different schools in Philadelphia was selected from among 75 schools in which principals and teachers had volunteered to participate in the investigation. Twelve classes in each treatment, four at each of the three ability score levels within each treatment, were involved in the study. Within ability score levels, classes and teachers were randomly assigned to treatments. It was hoped that random assignment would distribute initial differences across treatments. Of the 747 pupils in the 24 classes who completed the pretests, 674 remained to the end of the first-grade testing.

Tests

The following pretests were administered in September 1964: the Murphy-Durrell Diagnostic Readiness Test, the Metropolitan Readiness Test, the Pintner-Cunningham Primary Test of General Ability, and the Thurstone Pattern Copying and Identical Forms tests. As final measures of silent reading ability, the following tests were administered to all pupils remaining in the project after the 140 day instructional period in May 1965: the

Reading Test Based upon Linguistic Principles (Linguistic Reading Test), the Philadelphia Reading Test (PRT), and the Stanford Achievement Test, Primary, Battery I. In addition, the Gilmore Oral Reading Test, two word lists, and two writing tests were administered to a random sample of 90 children. Complete results were available for only 77 pupils in this subsample.

Findings

Summary of Results for Predictor Variables

In order to assess the initial differences between the two treatment groups at the beginning of the experiment, analysis of variance procedures were used to test the mean differences between treatments, sexes, and among ability score levels on a number of predictor variables.

When all the pupils in the linguistic group were compared with all the pupils in the basal reader group, the differences between means favored the basal reader group for: the Metropolitan Readiness Test total score, and subtests for Listening, Alphabet, Numbers and Copying; the Murphy-Durrell Diagnostic Readiness subtest scores for Phonemes and Letter Names; and the Pintner-Cunningham total raw score. The mean differences favored the pupils in the linguistic group for amount of preschool experience. There were no significant differences between the pupils in the two approaches for chronological age or attendance.

When the pupils at the three ability score levels were compared, the pupils at the high ability score level had the highest means and the pupils at the low ability score level

had the lowest means for: the mean total score and the six Metropolitan subtest scores; the three Murphy-Durrell subtest scores; and the Pintner-Cunningham total raw score. Pupils at the low ability score level had the greatest number of absences.

The girls had higher mean scores on the Metropolitan Word Meaning subtest, and on the Murphy-Durrell Phonemes subtest.

The 24 teachers who had been randomly assigned to treatment groups, varied widely in age and teaching experience. While there was some variation between treatments, the differences among ability score levels were greater. The mean differences for age and experience were not significant between treatments, but there was a significant difference among ability score levels for age. There was a tendency for the older and more experienced teachers to be associated with pupils in classes at the high and average ability score levels,and for the younger and less experienced teachers to be associated with pupils in classes at the low ability score levels. Teachers in the basal reader approach had been assigned significantly higher ratings by their principals.

Analysis of the data for predictor variables for teachers and pupils indicated that there were significant median within cell correlations between eight of the predictor variables and seven criterion variables. Five of these predictor variables differentiated significantly between treatments. All of these were pupil variables. The five predictor variables on which there were initial differences between treatments were: the Metropolitan total score; the Murphy-Durrell subtests for Phonemes, Letter Names, and Learning Rate; and the Pintner-

Cunningham total raw score. Pupil chronological age was included as the sixth predictor variable to be used as a covariate. Analysis of covariance was used to adjust the means of the criterion measures in order to control for the effects of initial differences between treatments.

Summary of Results for Criterion Variables for the Total Sample

The major objective of this investigation, a comparison of the relative effectiveness of two approaches to the teaching of reading in first grade at three ability score levels, was pursued by testing the first four hypotheses. The minor objective of the study, a comparison of the variables that distinguished between high and low achievers in the linguistic group and the variables that distinguished between high and low achievers in the basal reader group, was pursued by testing the fifth hypothesis. The data for testing these five hypotheses were based upon the seven criterion measures administered to the total sample: (1) total score on the PRT; (2) total score on the Linguistic Reading Test and the scores for the five Stanford subtests; (3) Word Reading; (4) Paragraph Meaning; (5) Vocabulary; (6) Spelling; and (7) Word Study Skills. The hypotheses and pertinent data for each are reported below.

Hypothesis 1. There is no significant difference between the reading achievement of first-grade pupils taught by a linguistic approach and the reading achievement of first-grade pupils taught by a basal reader approach. Hypothesis 1 was tested by the F tests for treatment effects.

When all the pupils in the linguistic approach were compared with all the pupils in the basal reader approach, the children in the linguistic group had a significantly higher adjusted mean score on the Linguistic Reading Test; and the children in the basal reader group had significantly higher adjusted mean scores on the PRT and on four of the five Stanford subtests: Paragraph Meaning, Vocabulary, Spelling, and Word Study Skills.

Hypothesis 2. There is no significant difference between the reading achievement of first-grade children taught by a linguistic approach and the reading achievement of first-grade children taught by a basal reader approach at high, average, and low ability score levels. Hypothesis 2 was tested by the Newman-Keuls procedures for testing the significance of differences between adjusted means for the two treatments at each of the three ability score levels.

At the high ability score level, there were significant mean differences between treatments at the .01 level. These differences favored the linguistic approach on the Linguistic Reading Test, and favored the basal reader approach on the PRT, and on the Stanford subtests for Paragraph Meaning, Vocabulary, Spelling, and Word Study Skills. Mean differences on the Stanford Word Reading subtest were not significant.

There were significant mean differences at the .01 level between the two treatments at the average ability score level. The linguistic approach was favored on the Linguistic Reading Test, and the basal reader approach was favored on the Stanford Vocabulary subtest. None of the other mean differences between

the two approaches at the average ability score level was significant.

At the low ability score level, there were significant mean differences between the two treatments at the .01 level. These mean differences favored the linguistic approach on the Linguistic Reading Test, and favored the basal reader approach on the PRT and on the Stanford subtests for Spelling and Word Study Skills. The mean differences between the two approaches on the Stanford Word Reading subtest were significant at the .05 level, and favored the basal reader approach. There were no significant differences between treatments at the low ability score level on the Stanford subtests for Word Reading and Paragraph Meaning.

Hypothesis 3. There is no significant difference between the reading achievement of first-grade boys and girls taught by a linguistic approach and by a basal reader approach. Hypothesis 3 was tested by the *F* tests for sex effects.

Girls had significantly higher adjusted means on five of the seven criterion measures administered to the total sample. These differences were for: the Linguistic Reading Test, the PRT, and the Stanford subtests for Paragraph Meaning, Spelling, and Word Study Skills.

Hypothesis 4. There is no significant interaction between treatments and ability score levels in the reading achievement of first-grade pupils taught by a linguistic approach and by a basal reader approach. Hypothesis 4 was tested by *F* tests for treatment and ability score level interaction.

There were significant interactions between treatments and the linear component of ability-score level differences on four of the seven criterion variables for the total sample. These significant linear interactions were on the Linguistic Reading Test, and Stanford subtests for Paragraph Meaning, Vocabulary, and Word Study Skills. There were significant interactions between treatments and the quadratic component of ability-score-level differences for all seven criterion measures. The significant interactions indicated that the significant treatment differences were not consistent at all ability score levels.

The significant interaction on the Linguistic Reading Test was characterized by significantly higher adjusted means of varying sizes at various ability score levels for the linguistic group. On the Stanford Paragraph Meaning subtest, the significant interaction was characterized by superiority of the basal reader group at the high ability score level, while the performance of the pupils at the other two ability score levels was not significantly different. On the Stanford Vocabulary subtest, the significant interaction was characterized by superiority of the basal reader group at the high and average ability score levels, while the difference between the two approaches at the low ability score level was not significant. For the PRT and for the three Stanford subtests, the significant interaction was characterized by the superiority of the pupils in the basal reader approach at the high and low ability score levels, while the difference between the two approaches at the average ability score level was not significantly different.

Hypothesis 5. There are no variables that are more

highly related to reading achievement for first-grade pupils in the linguistic approach than for first-grade pupils in the basal reader approach.

One of the eight pupil variables had a significantly higher correlation with criteria for one group than for the other. The correlation for Pintner-Cunningham total raw score was significantly higher at the .05 level for the basal reader group. Since one of significant correlations out of eight could easily have occurred by chance, it seems safest not to try to interpret this difference.

The relationship between teacher variables and criteria were significantly different in one treatment than in the other for four out of five teacher variables. Teacher age was more highly related to achievement for the linguistic group. Total teaching experience, total first-grade teaching experience and principal's rating had a higher relationship with criteria in the basal reader group. These correlations should not be interpreted as indications of causality. However, in each group, these correlations were based upon data for only twelve teachers. It is likely that the larger correlations arose from the general tendency for the teachers of the higher ability classes to be older and more experienced. The within cell correlations for the variables were near zero.

Summary of Results for Criterion Measures for Subsample

There were seven criterion measures obtained for the randomly drawn subsample: (1) the Gilmore oral reading rate; (2) the Gilmore accuracy of oral reading; (3) the Gates Word Pro-

nunciation Test; (4) the Fry Phonetically Regular Words Oral Reading Test; and three measures from the writing sample- (5) the mechanics-ratio score; (6) the number of correctly spelled words; and (7) the total number of words written.

The only significant difference between the two approaches on the oral reading measures was for the Gilmore rate of oral reading. This difference was significant at the .05 level, and favored the basal reader approach. There were no significant differences among ability score levels for either the linear or the quadratic components, or between sexes. Only one of the interactions was significant. This was for sex and ability score level (quadratic component), which was significant at the .05 level.

The linguistic approach had significantly higher adjusted means for all three measures of the writing sample. The differences were significant at the .01 level. There were no significant differences among ability score levels. Boys had significantly higher scores for mechanics-ratio. None of the interactions was significant.

Conclusion

The conclusion drawn from the present investigation is that when the two treatment groups are considered as a whole (that is, without breakdown by ability score levels or sexes), and when the evidence obtained from all of the criterion variables is taken into account, no general statement can be made about the superiority of one approach over the other.

This conclusion is drawn even though there were sig-

nificant differences between treatments favoring the basal reader group for five of the seven criterion measures taken by pupils in the total sample. These significant differences were for the PRT, and for the Paragraph Meaning, Vocabulary, Spelling, and Word Study Skills subtests of the Stanford Achievement Test. However, caution in the interpretation of significant main effect differences for treatments is dictated by the presence of significant linear interaction between treatments and ability score levels for four of the seven criteria and of significant quadratic interaction for all seven criteria for the total sample.

It has already been indicated that conclusions concerning main effects must be qualified since interactions indicate that treatment effects although significant are not consistent at all ability score levels, sometimes reversing at the average and low or average and high ability score levels. The results of the analysis of covariance need two additional qualifications. The first qualification is related to additional variables likely to have been left uncontrolled. The posttest mean scores were adjusted for differences on six pupil predictor variables. Since differences existed between treatment groups and ability score levels on six predictor variables, it is likely that differences also existed on other variables not measured, such as pupil motivation, differences in school facilities, or certain teacher characteristics. While it was hoped that pupil achievement on the final tests could also be controlled for teacher effects, the analysis of the teacher data collected indicated that the teacher variables

for which data were available were not useful as covariates. The teachers in the two treatment groups did not differ significantly in total teaching experience or in first-grade teaching experience, while they did differ significantly on principal's rating. However, none of these variables was significantly correlated with pupil achievement on the criterion measures. The treatment differences that did exist for teacher variables tended to favor the teachers in the basal reader approach.

The second qualification is related to the range of achievement measured by the various tests. Many pupils at the high ability score level received near perfect scores while many pupils at the low ability score level received near chance guessing scores on the criterion measures. These resulted in a truncation of scores at either end of the distribution. A better estimate of some of the pupil's achievement may have been off either end of the scale. Some of the cell means for pupil achievement are undoubtedly misrepresented, which probably accounts for some of the quadratic ability effects and the quadratic interaction components. Further, the scores for some variables indicate that there was more difference between the average and high ability score levels than between the average and low ability score levels. Such variation in difference between levels would also contribute to quadratic ability effects and quadratic interactions.

Discussion

The following discussion will consider seven topics: (1) the superiority of the pupils in the linguistic approach on the Linguistic Reading Test; (2) Sex differences; (3) Hawthorne

Effect; (4) the familiarity of the approach to teachers; (5) the increased awareness by teachers of individual differences; (6) the effect of writing as an element in reading instruction; and (7) the possibility of test bias.

Superiority of Linguistic Approach on Linguistic Reading Test

The superiority of the pupils using the linguistic reading approach (at all ability score levels) on the Linguistic Reading Test cannot be said to be unexpected. Yet, the investigators believe that the differences at the upper ability score level would probably be quite small, while the larger differences would occur at the low ability score level. It was assumed that the brighter pupils using the basal reader approach, many of whom were reading in a second reader by the end of the first year, would have achieved as well as the pupils at the high ability score level in the linguistic group. One obvious conclusion is that the Linguistic Reading Test favored the linguistic group by virtue of the fact that it contained words from their reading materials presented in familiar context.

Sex Differences

The superior performance by the girls on five of the seven criterion measures taken by pupils in the total sample bears out the findings from previous research in this area.

Gates (1961) studied sex differences in reading ability for 13,114 pupils in grades two through eight. Out of 21 comparisons, the scores for girls exceeded those for boys and the differences were significant. Gates concluded that on the average the reading abilities of girls exceeded those of boys.

Heilman (1961) reported data from a number of studies showing the percentages of boys and girls referred as remedial reading subjects. The percentage of boys referred for help varied from 67 to 90 per cent, while the percentage of girl referrals varied from 10 to 33 per cent.

Some investigators have suggested that cultural factors are related to the lag in reading achievement by the boys. Mazurkiewicz (1960) notes that "...in the population studied, members of the male sex generally view reading as a mostly feminine activity and that this attitude seemingly exerts some influence on a boy's reading ability."

In a comparison of the reading achievement of German and American children at the fourth and sixth grade levels, Preston (1962) found that the achievement of American girls exceeded that of American boys, while the opposite was true among the German children. A higher incidence of reading retardation among American boys than among American girls was found, while the reverse was true among German children. Preston suggested that the apparent superiority of German boys over German girls could be due to elements within the German culture that identify reading and learning activities as normal for the male. One of these cultural factors was believed to be the predominance of male teachers in German schools, even at the elementary level.

Hawthorne Effect

When one of the two approaches in a comparative study of reading methods is experimental and new to the teachers, the problem of the Hawthorne Effect requires particular considera-

tion. Efforts were made to avoid having the teachers in the linguistic approach believe they were in the only experimental approach while the teachers in the basal reader group were in the control approach. These efforts included: (1) referring to both of the approaches as "experimental approaches," the term "control approach" was avoided; (2) both approaches used new instructional materials: the linguistic approach used a new experimental edition of specially prepared materials, and the basal reader approach used the recently revised "Sixties edition" of the Scott, Foresman New Basic Readers; (3) equal amounts of time for training, supervision, and consultation were provided teachers in both treatments.

Familiarity of Approach to Teachers

While the basal reader approach was the method most familiar to teachers, it was discovered that this approach was at least partially new to the teachers assigned to the treatment. Many of the teachers using the basal readers reported that they had previously used a combination approach for developing sight vocabulary through experience stories before advancing into the preprimers of the basal system. Some teachers reported that they previously had not followed the teacher's manuals in any systematic way -- if at all. Similarly, the workbooks accompanying the basal readers had not been used previously by some teachers, and had been used unsystematically by others. None of the teachers in the linguistic group had ever used the linguistic approach before.

Greater Awareness of Individual Differences

One interesting outcome of the final evaluation of the project by the teachers in both treatment groups is that almost all of the teachers believed their teaching effectiveness to have been considerably improved as a result of the intensive supervision and consultation services made available through the experiment. As a result of supervisor-teacher conferences, teachers reported a greater sensitivity to the range of individual differences and to the need for ability level grouping within classes even when the classes were purportedly homogeneously grouped.

For example, some of the teachers previously had followed the practice of not taking the pupils beyond the reading materials in the first-grade program. In most of the classes at the high ability score levels, and in a few classes at the average ability score levels, a number of pupils completed the readers, practice books, and supplementary materials for the first-grade program before the end of the year. Informal tests indicated that the instructional level for some of these pupils was at the second reader level or beyond. Some of the teachers were concerned that they would not be able to teach reading with the second reader program as effectively as they had taught with the first reader program. With the assistance of the supervisors, the teachers were encouraged to move those children who had successfully completed the first reader materials into the second reader program. Those teachers who previously had not advanced their more able pupils beyond the materials of the first reader program were favorably impressed with the progress of the children.

The Effect of Writing as an Element in Reading Introduction

Superiority of the pupils in the linguistic group on the writing sample raises an interesting question that calls for further exploration. Practice by the pupils in writing their own sentences and simple stories at the chalkboard and at their seats is a basic procedure in the linguistic approach. Pupils in the basal reader approach did much less writing as part of their learning experiences. Since the pupils in the two approaches had an uneven amount of practice in writing sentences or compositions, the question arises about whether pupils in the basal reader approach might with a small amount of practice catch up or even exceed the linguistic group. The three measures obtained from the writing sample (mechanics-ratio score, spelling score, and number of words written) seemed to favor the child who was able to write a longer composition that might consist of a disorganized series of words spelled correctly rather than the pupil who wrote more creatively with better organization, although with more misspellings. Further research is planned to study this question. It is hoped that the pupils in the basal reader group will be given increasing opportunities to express themselves in writing and that some measure can be devised that will more accurately reflect the creative nature of the writing. If pupils in the linguistic group continue to maintain superiority on later testing, it would then be appropriate to conclude that the linguistic approach makes a lasting contribution in this area.

Possible Bias of Criterion Measures

One of the most difficult problems facing the investigator who is comparing two different approaches to the teaching of reading is the selection of criterion measures that are not overly biased for or against either of the approaches. The question of concern is: to what extent do the criterion measures contain words that give an advantage to one or the other of the treatment groups on the basis of familiarity alone? To answer this question, the vocabulary contained in each of the reading series used in this study was examined to determine which words found in the Stanford subtests and in the Linguistic Reading Test also appeared in the readers and workbooks in each series. The vocabulary from the two sets of reading materials that appeared in the criterion measures was analyzed by constructing cumulative percentage curves showing the percentage of words on the Stanford subtests and on the Linguistic Reading Test that had been met by a given percentage of pupils in their respective readers and workbooks. These cumulative percentage graphs for each of the Stanford subtests and for the Linguistic Reading Test are shown in Figures 8 - 13.

On the Stanford Word Reading Test, the linguistic group had met a slightly larger percentage of words at the high and average ability score levels, but this difference was not consistent at the low ability score level. (See Figure 8.) In actual performance on this subtest, there was no significant difference between the adjusted mean scores of the two treatment groups.

On the Stanford Paragraph Meaning subtest, the pupils in the basal reader treatment had been exposed to a much larger

Figure 8

CUMULATIVE PERCENTAGE OF WORDS IN STANFORD WORD READING SUBTEST CONTAINED IN THE READING MATERIALS USED BY A GIVEN PERCENTAGE OF PUPILS

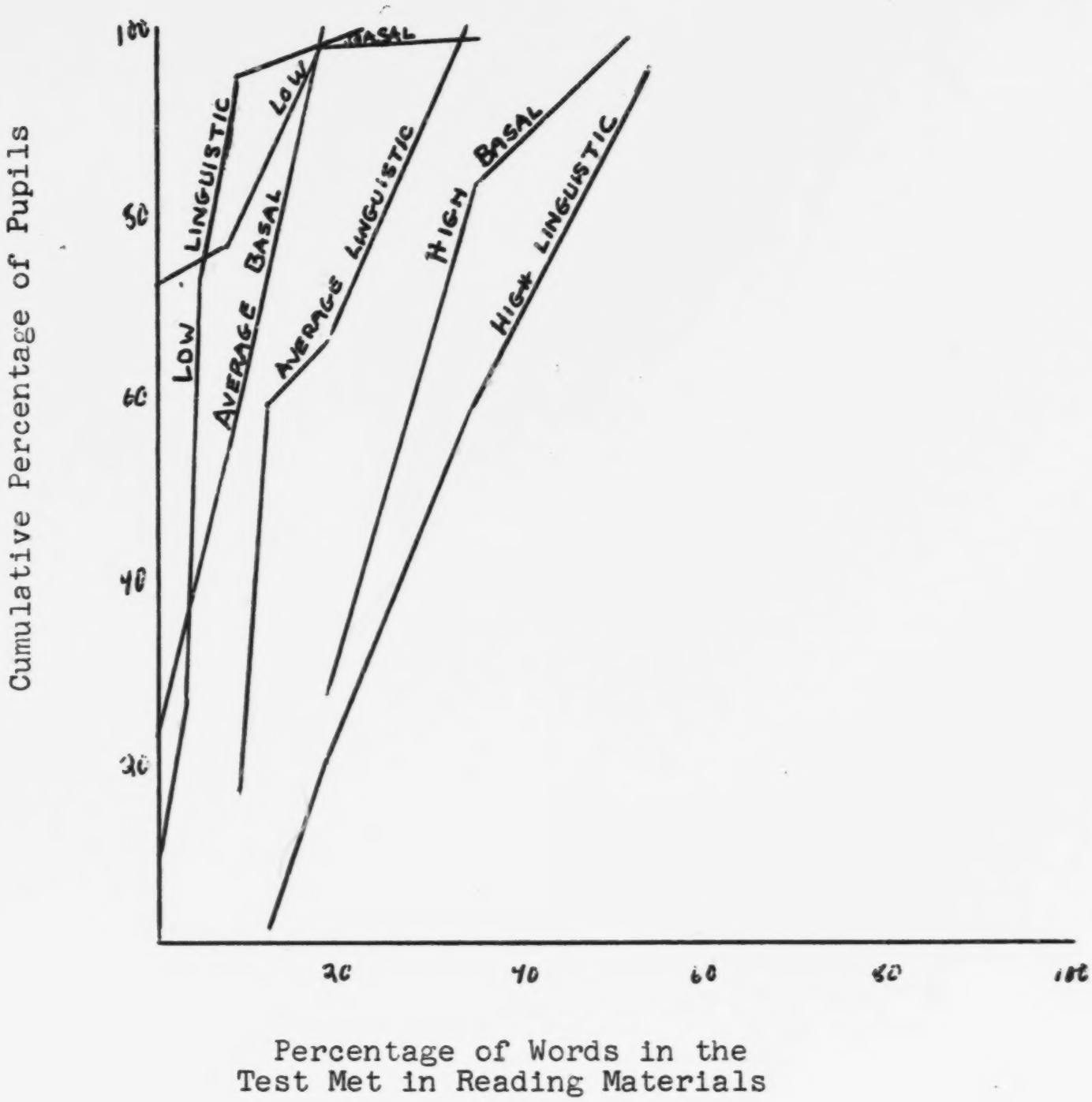


Figure 9

CUMULATIVE PERCENTAGE OF WORDS IN STANFORD PARAGRAPH MEANING SUBTEST CONTAINED IN THE READING MATERIALS USED BY A GIVEN PERCENTAGE OF PUPILS

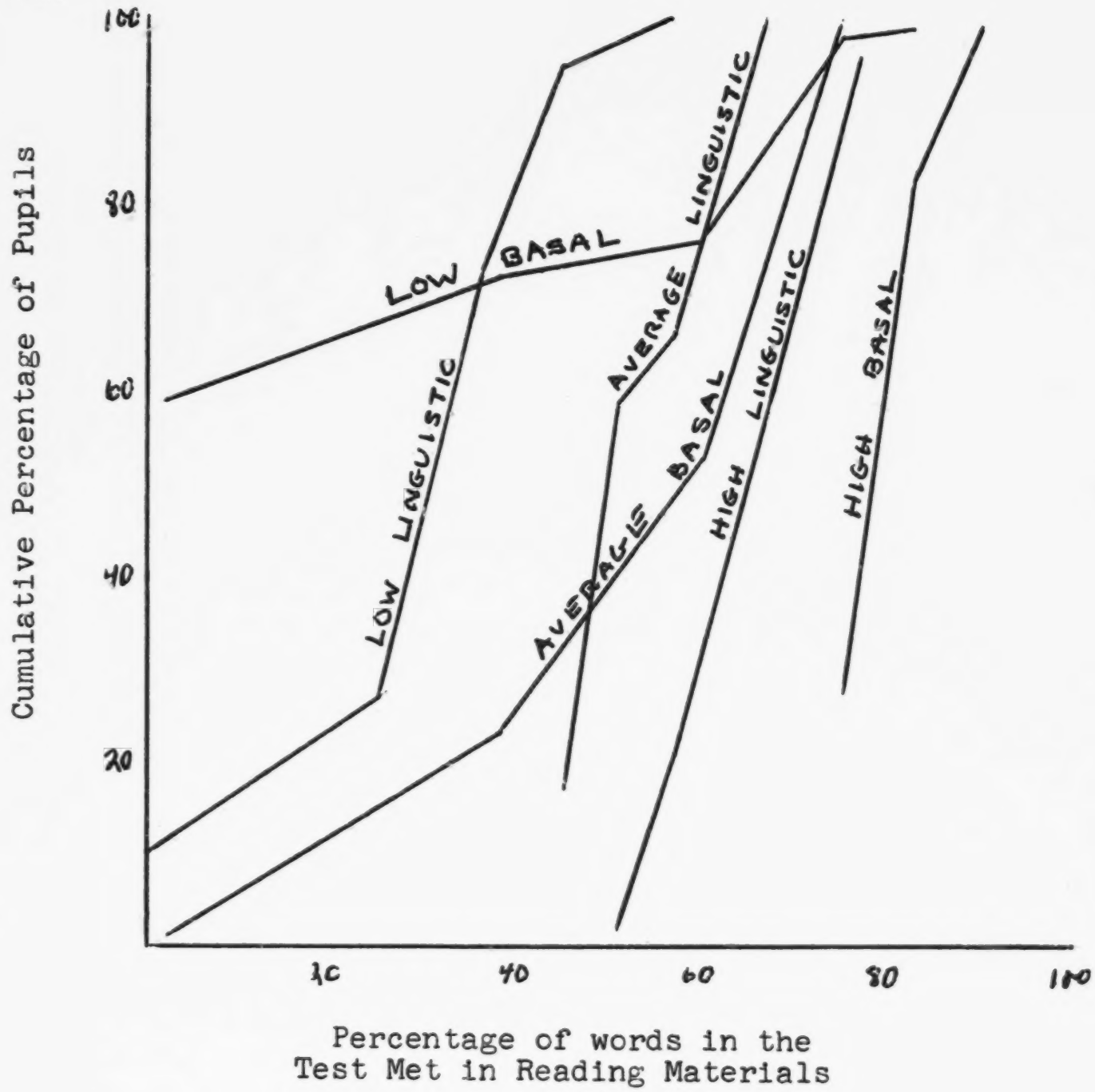


Figure 10

CUMULATIVE PERCENTAGE OF WORDS IN STANFORD VOCABULARY SUBTEST CONTAINED IN THE READING MATERIALS USED BY A GIVEN PERCENTAGE OF PUPILS

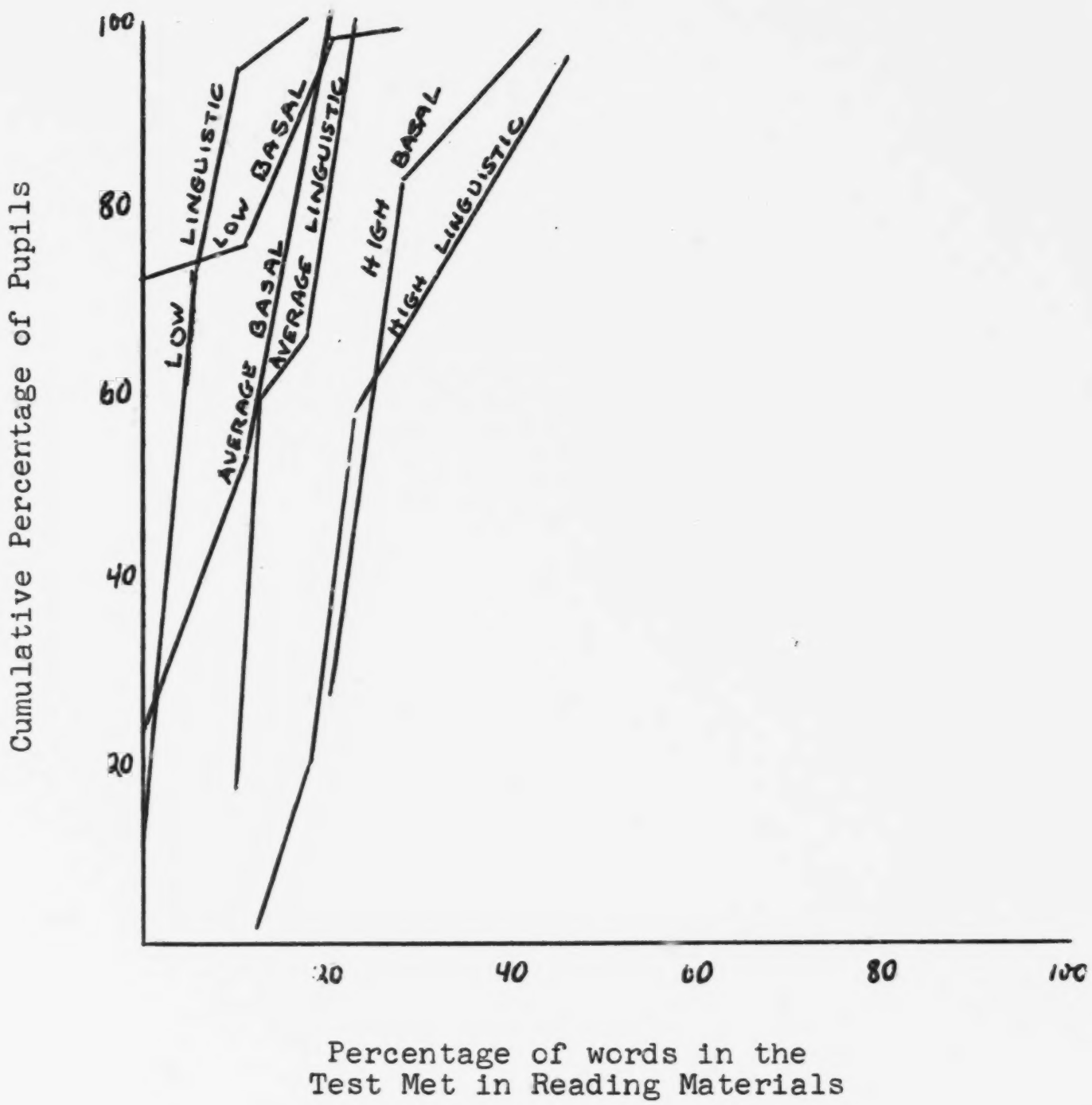


Figure 11

CUMULATIVE PERCENTAGE OF WORDS IN STANFORD SPELLING SUBTEST CONTAINED IN THE READING MATERIALS USED BY A GIVEN PERCENTAGE OF PUPILS

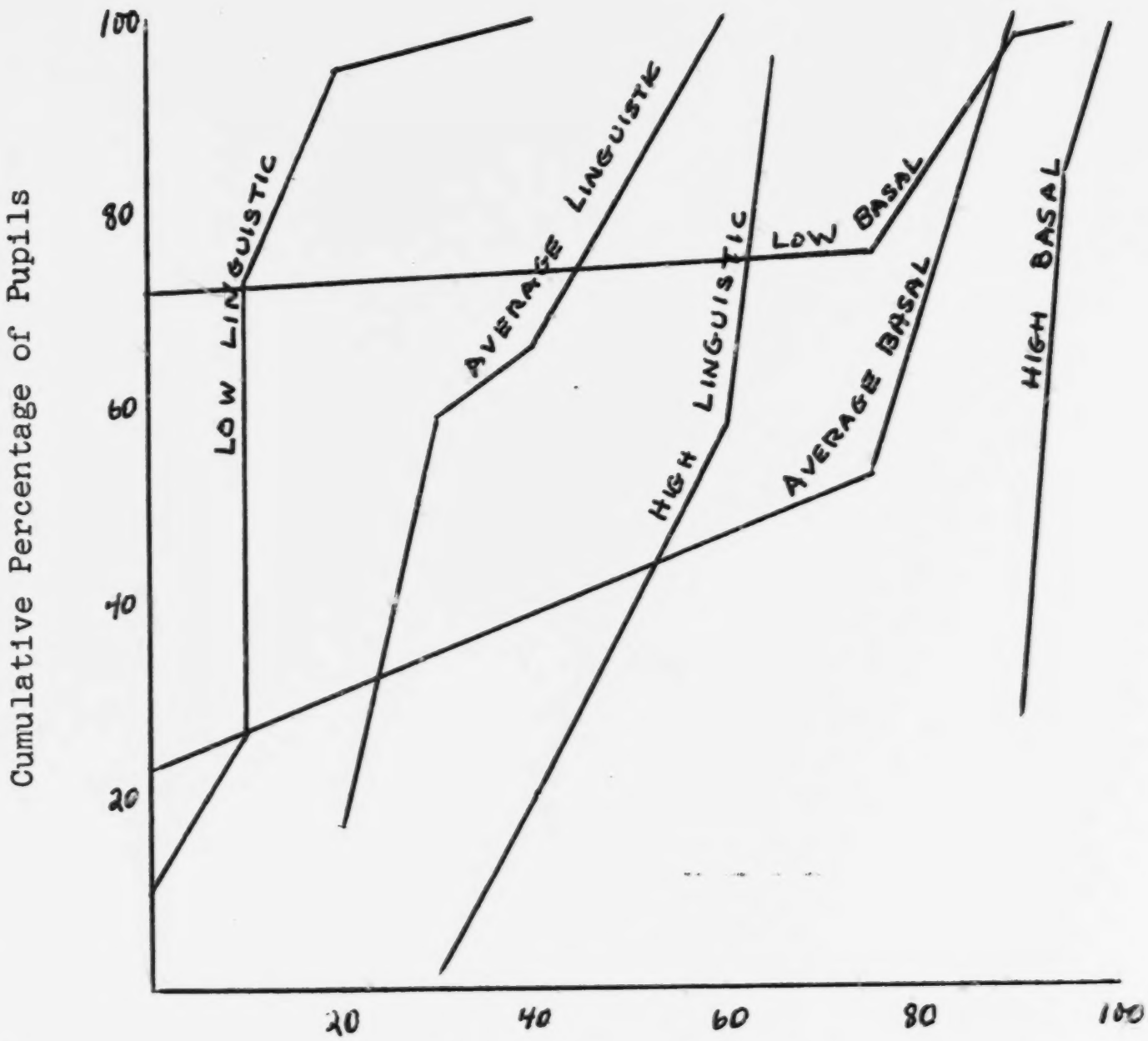


Figure 12

CUMULATIVE PERCENTAGE OF WORDS IN STANFORD WORD STUDY SUBTEST CONTAINED IN THE READING MATERIALS USED BY A GIVEN PERCENTAGE OF PUPILS

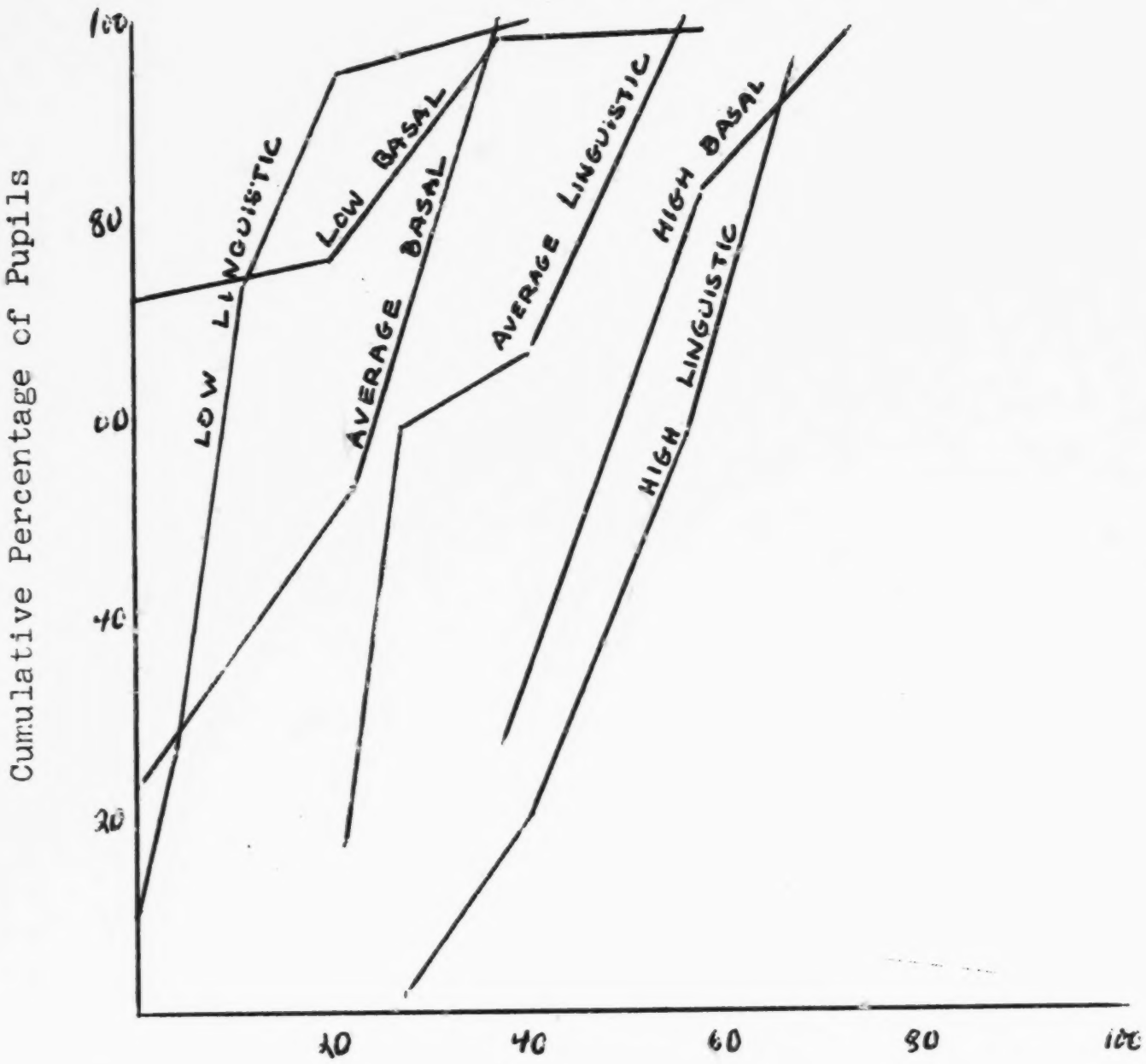
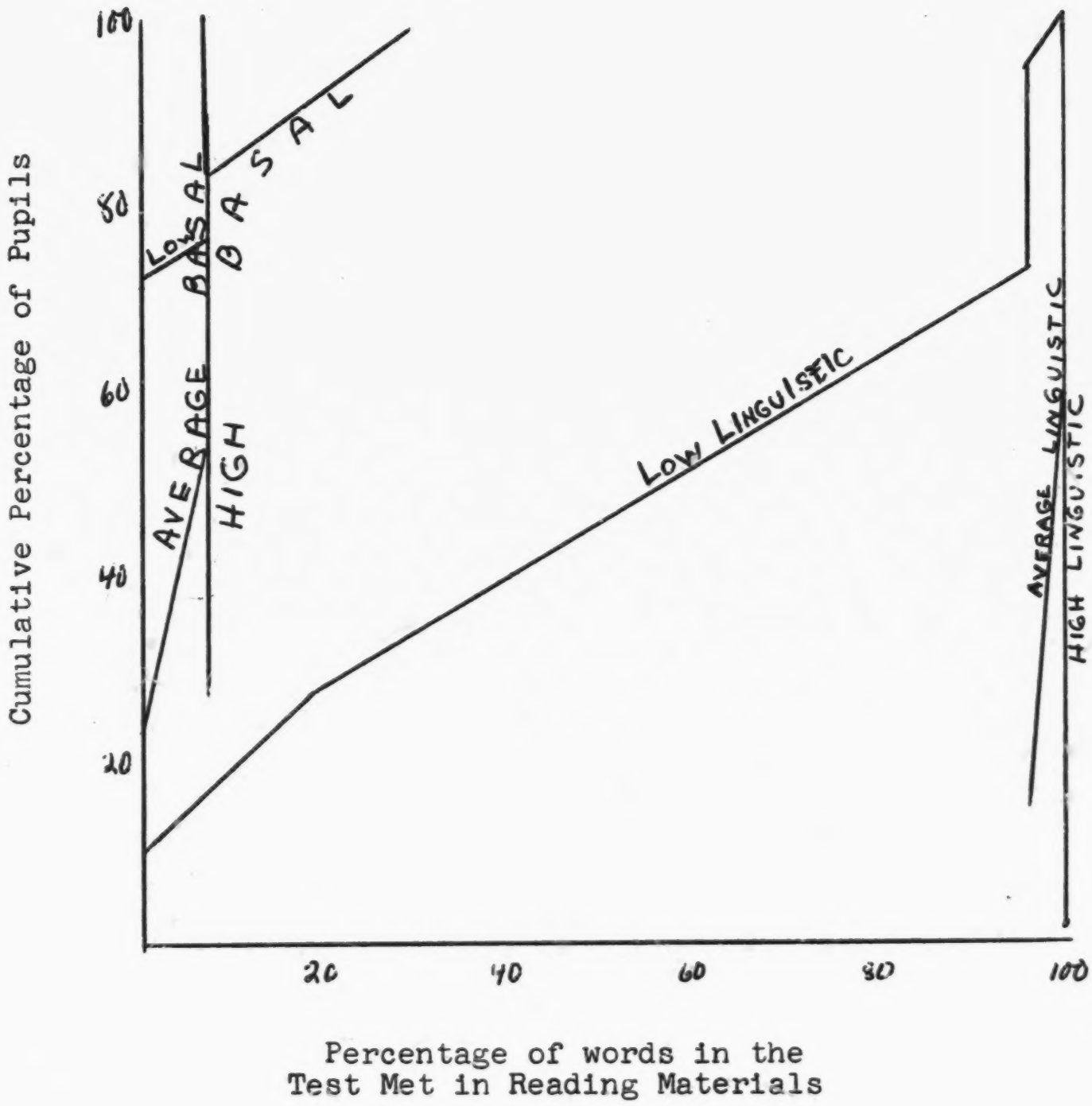


Figure 13

CUMULATIVE PERCENTAGE OF WORDS IN
LINGUISTIC READING TEST CONTAINED
IN THE READING MATERIALS USED
BY A GIVEN PERCENTAGE OF PUPILS



percentage of words in their reading materials than had the pupils in the linguistic group. (See Figure 9.) In performance of this test, the basal reader group had the significantly higher adjusted mean score.

On the Stanford Vocabulary subtest, while the linguistic group was favored at some points, the basal reader group was favored at others, and the results were not consistent. (See Figure 10.) Neither group appears to have the distinct advantage in number of words previously met. In actual performance on the test, the basal reader treatment had the significantly higher adjusted mean score.

On the Stanford Spelling subtest, the pupils in the basal reader treatment had a much greater advantage in number of words previously met. (See Figure 11.) In performance on the test, the basal reader treatment had the significantly higher adjusted mean score.

On the Stanford Word Study Skills subtest, the pupils in the linguistic group had met a much greater number of the test words, particularly at the high and average ability score levels. (See Figure 12.) The basal reader treatment group, however, achieved the significantly higher adjusted mean score.

On the Linguistic Reading Test, the pupils in the linguistic treatment had a large advantage at all levels. (See Figure 13.) In performance on the test, the linguistic group achieved the significantly higher adjusted mean score.

The analysis of the vocabulary of the five Stanford subtests and of the Linguistic Reading Test suggests that there was some bias on each of the tests favoring either one group

or the other. The linguistic group was heavily favored on the Linguistic Reading Test and appeared to have some advantage on the Stanford subtests for Word Reading and Word Study Skills. The basal reader group appeared to have some advantage on the Stanford subtests for Paragraph Meaning and Spelling. Neither group appeared to have a distinct advantage on the Vocabulary subtest.

When the results of the vocabulary analysis of the criterion measures and the two sets of reading materials were examined, it appeared that neither treatment group had an overwhelming advantage in terms of having previously encountered the vocabulary of the Stanford Achievement Test, although the linguistic group had a distinct advantage on the Linguistic Reading Test. While there is undoubtedly some bias in the criterion measures, there would appear to be reasonable doubt that this bias accounts for all of the differences in the final results.

Implication

The possibility of bias on the testing instruments is one reason why it was hoped that the comparative study could be extended for at least two more years. As noted previously, a follow-up investigation comparing the basal reader approach and the Fries linguistic approach for two additional years is currently under way. This follow-up study is being supported by the Cooperative Research Program of the U. S. Office of Education. Pupils remaining from the present study of first-grade reading achievement are being followed into the second and third

grades. The possible effects of test bias should be much less of a problem by the end of the second and third grades, since the vocabularies encountered by pupils in the two approaches should be more similar as greater variety of reading content is included in the reading materials.

The investigators believe that conclusions drawn from this study of reading achievement at the end of the first grade should be considered tentative and subject to further evaluation in the follow-up study, since the acquisition of reading skills cannot be conclusively evaluated on the basis of initial learning experiences alone. It is possible that some of the initial differences may disappear or that other differences not now present will emerge. By the end of the third grade, the possibilities that the results have been influenced by biases built into the testing instruments or by the effects of involvement in an experiment upon pupil achievement, should be considerably lessened. It seems apparent at this time that final answers to some of the crucial questions concerning reading achievement under initially different approaches to the teaching of reading must be held in abeyance.

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APPENDICES A - F

RAW SCORE MEANS, STANDARD DEVIATIONS, AND ANALYSIS OF VARIANCE *F* RATIOS FOR CRITERION MEASURES

APPENDIX A

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR LINGUISTIC READING TEST

Group	Means	Standard Deviations
High Basal Boys	42.75	4.48
High Linguistic Boys	43.89	4.37
High Basal Girls	44.06	4.44
High Linguistic Girls	44.82	3.60
Average Basal Boys	26.68	9.00
Average Linguistic Boys	33.38	8.17
Average Basal Girls	25.97	9.29
Average Linguistic Girls	35.89	7.80
Low Basal Boys	18.22	7.39
Low Linguistic Boys	22.43	9.89
Low Basal Girls	19.14	10.01
Low Linguistic Girls	23.69	7.22
Total Treatment		
Basal	30.56	12.69
Linguistic	34.79	11.09

APPENDIX B

RAW-SCORE MEANS AND STANDARD DEVIATIONS FOR PHILADELPHIA READING TEST

Group	Means	Standard Deviations
High Basal Boys	41.82	3.27
High Linguistic Boys	36.14	8.52
High Basal Girls	42.03	3.10
High Linguistic Girls	37.59	8.27
Average Basal Boys	25.84	9.12
Average Linguistic Boys	23.92	8.36
Average Basal Girls	27.16	9.20
Average Linguistic Girls	25.27	9.03
Low Basal Boys	17.22	8.08
Low Linguistic Boys	14.06	4.86
Low Basal Girls	20.00	8.41
Low Linguistic Girls	14.73	4.76
Total Treatment		
Basal	30.00	11.97
Linguistic	26.09	11.87

APPENDIX C

RAW-SCORE MEANS AND STANDARD DEVIATIONS STANFORD ACHIEVEMENT SUBTESTS

Group	Word Reading	Paragraph Meaning	Vocabulary	Spelling	Word Study Skills
			Means		
High Basal Boys	27.84	30.10	28.67	18.02	47.53
High Ling. Boys	25.27	24.76	25.29	14.52	44.00
High Basal Girls	28.49	31.91	27.79	18.30	48.63
High Ling. Girls	25.15	26.54	24.64	15.16	44.92
Ave. Basal Boys	16.52	15.04	19.30	8.86	32.54
Ave. Ling. Boys	14.67	11.50	16.34	7.55	29.03
Ave. Basal Girls	16.19	15.45	20.76	10.12	33.40
Ave. Ling. Girls	15.44	13.76	15.95	8.60	30.62
Low Basal Boys	10.48	7.39	12.91	3.91	23.93
Low Ling. Boys	8.20	7.37	13.14	1.65	19.08
Low Basal Girls	10.38	7.22	12.59	5.95	26.78
Low Ling. Girls	9.52	7.63	12.67	1.46	20.46
Total Treatment					
Basal	19.13	18.95	21.10	11.43	36.38
Linguistic	16.97	15.86	18.44	8.63	32.23
			Standard Deviations		
High Basal Boys	5.03	5.85	4.54	2.26	4.95
High Ling. Boys	6.83	8.85	5.32	5.14	7.25
High Basal Girls	4.80	4.68	4.55	1.92	5.69
High Ling. Girls	6.86	8.01	5.61	4.77	7.29
Ave. Basal Boys	6.33	7.10	7.59	5.77	8.12
Ave. Ling. Boys	5.85	5.58	4.69	5.16	8.65
Ave. Basal Girls	5.72	7.27	8.26	5.17	7.33
Ave. Ling. Girls	5.47	5.94	3.61	5.65	7.52
Low Basal Boys	4.46	4.48	3.98	4.40	9.01
Low Ling. Boys	3.56	4.18	4.47	3.03	6.36
Low Basal Girls	4.11	5.29	2.98	5.58	10.25
Low Ling. Girls	4.43	3.83	5.22	2.30	5.39
Total Treatment					
Basal	8.89	11.35	8.41	7.01	11.91
Linguistic	8.83	10.07	7.08	7.05	12.40

APPENDIX D

ANALYSIS OF VARIANCE F RATIOS FOR SEVEN CRITERION VARIABLES

Source of Variation	Linguistic Reading Test	Phila. Reading Test	Stanford Subtests: Word Reading	Paragraph Meaning	Vocabulary	Spelling	Word Study Skills
Treatment (T)	39.97**	63.56**	22.37**	36.75**	36.74**	54.68**	46.91**
Ability Score Level Linear (AL)	1016.96**	1038.26**	1039.13**	1210.62**	687.72**	977.24**	1190.22**
Ability Score Level Quadratic (AQ)	13.27**	13.25**	29.10**	58.85**	12.91**	6.15*	20.97**
Sex (S)	13.05**	10.60**	5.67*	18.64**	.86	12.62**	13.56**
T x AL	.55	8.09**	1.83	20.63**	8.54**	.20	.90
T x AQ	5.11*	22.13**	1.23	.00	6.77**	6.10*	1.05
T x S	.06	.48	.21	.37	.67	.51	.00
S x AL	.21	.07	.13	1.92	.36	.01	.15
S x AQ	.00	.11	.15	.02	1.27	.76	.00
T x S x AL	1.40	.14	1.02	.07	.10	1.40	.01
T x S x AQ	.05	1.89	.21	.67	1.12	.11	.22

df - 1,662 *Significant at the .05 level. **Significant at .01 level.

APPENDIX E

ANALYSIS OF VARIANCE F RATIOS FOR ORAL READING TESTS

	Gilmore Accuracy	Gilmore Rate	Fry	Gates
Treatment (T)	10.36**	10.49**	4.01*	7.48**
Ability Linear (AL)	64.67**	52.54**	108.64**	109.26**
Ability Quadratic (AQ)	7.63**	2.15	12.30**	15.46**
Sex (S)	11.23**	7.43**	14.16**	11.80**
T x AL	3.15	.03	7.30**	.73
T x AQ	.73	1.28	.69	.11
T x S	.00	.40	.18	.00
S x AL	.30	.02	.92	1.17
S x AQ	.80	4.49*	1.86	1.52
T x S x AL	.97	1.92	.69	.21
T x S x AQ	.16	.12	.29	.04

*Significant at .05 level.
**Significant at .01 level.
df - 1,65

APPENDIX F

ANALYSIS OF VARIANCE F RATIOS FOR RESTRICTED WRITING SAMPLE (RWS)

	RWS Mech. Ratio	RWS Spelling	RWS Running Words
Treatment (T)	4.13*	3.78	3.45
Ability Linear (AL)	15.07**	19.65**	19.87**
Ability Quadratic (AQ)	.03	.78	.33
Sex (S)	.65	7.01*	9.30**
T x AL	.42	.29	.52
T x AQ	.46	.63	.70
T x S	.03	.11	.02
S x AL	.21	.69	.88
S x AQ	.94	.89	1.18
T x S x AL	.12	.01	.01
T x S x AQ	3.26	1.01	.82

*Significant at .05 level.
**Significant at .01 level.
df - 1,65

APPENDIX G

DIRECTIONS FOR ADMINISTRATION AND SCORING OF RESTRICTED WRITING SAMPLES

First Grade Written Language Measures
USOE Cooperative Research Project

Directions to the Classroom Teacher

General Information

You are being asked to obtain two writing samples from each pupil in your classroom. We wish to emphasize the necessity of following the directions and procedures exactly.

As you realize, many other teachers throughout the nation will also be asked to obtain writing samples from their pupils. It is necessary, therefore, that these samples be obtained in all classrooms at approximately the same time and by following the same directions.

You are requested to obtain the first writing sample (Restricted Stimulus Measure) on _____.
(Project Director Specifies Date)

The second writing sample (Unique Stimulus Measure) should be obtained on _____.
(Project Director Specifies Date)

DIRECTIONS--RESTRICTED STIMULUS MEASURE

Classroom Situation

No attempt should be made to enrich your normal room display through the use of word lists, pictures, dictionaries, etc. The classroom conditions should approximate those normally found in your daily writing activities.

Materials

The writing paper and pencils customarily used in your classroom should be used in obtaining this sample.

Identification

The pupil's name, teacher's name, and the school should be indicated on each pupil's paper. In some cases, you might initial the back of each paper, or a code number may be assigned by your Project Director.

Teacher Directions to the Pupils

You are requested to spend a minimum amount of time motivating the class to write a story. This motivation should consist of:

1. General encouragement to the whole class that you are interested in reading their stories and that they are to use their very best handwriting.
2. Additional encouragement to individual pupils by such directions as:

   "I'm sure you have an interesting story you would like to write for me today, Billy."

   "Sally, I'll bet you have a really good story you would like to write for me."

   "I liked that story you wrote for me last week, Mary. I'm sure you could write another one for me. Let's try."

This additional motivation should be of a general type and should be directed toward getting the pupils to write rather than in providing them with specific ideas.

It is particularly cautioned that no specific titles be presented, nor should pictures or other stimuli be employed.

Other Procedures

No spelling help should be provided during the writing

period.

If pupils request spelling assistance, they should be told to try to spell the word and then encouraged to proceed.

If pupils normally use a simplified dictionary or write from displayed flashcards or use a speller, such practices may be allowed.

Under no circumstances, however, should you correct misspellings, give ideas, or assist the pupil beyond the point of general encouragement.

Time Limit

Following the heading of the paper, twenty minutes should be allowed for the pupils to finish their stories. Papers of pupils who finish early should be inconspicuously collected and a coloring exercise or similar silent activity should be provided for the remainder of the twenty minutes.

Written Sample Identification

At the end of twenty minutes, all stories should be collected, packaged, and clearly labeled:

RESTRICTED STIMULUS SAMPLES (Date)_____

You are not to correct these stories; they will be corrected and scored by the Project Director's Staff who will apprise you of the correction procedures should you desire this information.

DIRECTIONS -- UNIQUE STIMULUS MEASURE

This second writing sample should be obtained on the date specified by your Project Director.

The purpose of this measure is to give your pupils an opportunity to write stories using a motivational stimulus with which they are familiar.

Materials

The writing paper and pencils customarily used in your classroom should be used for obtaining this sample.

Identification

The pupil's name, teacher's name, and the school should be indicated on each pupil's paper. In some cases, you might initial the back of each paper, or a code number may be assigned by your Project Director.

Teacher Directions to the Pupils

You may spend as much time as your normally would spend in motivating your pupils to write a story. The amount of time which you spend on this motivational activity should be indicated on the Unique Stimulus Checklist in the space provided.

You may use whatever motivational devices your normally use in encouraging your pupils to write stories.

The research value of these samples depends on your ability to maintain a normal classroom writing situation and then to briefly, but accurately, describe the procedures which you employed.

CORRECTION PROCEDURES

MECHANICS-RATIO SCALE:

It is suggested that the papers be corrected by three staff members. Corrections should be made for:

Capitalization Red (ball point) circles should be drawn around all possible capitalizations.

If the pupil has capitalized correctly, a red diagonal line should be drawn through the circle.

The mechanics-ratio score for capitalization will be the number correct over the number possible.

Score: 1 point for each correct capital in the title.

1 point for each correct capital at the beginning of a sentence.

1 point for each correct capitalization of a proper name.

1 point for each correct capitalization of a day or month.

1 point for each correctly capitalized "I".

Punctuation Blue (ball point) circles should be drawn around all possible punctuations.

If the pupil has punctuated correctly, a blue diagonal line should be drawn through the circle.

The mechanics-ratio score for punctuation will be the number correct over the number possible.

Score: 1 point for each correct (.) period.

1 point for each correct (?) question mark.

1 point for each correct(!) exclamation mark.

1 point for each correct (" ") set of quotation marks.

1 point for each correct (,) comma in a direct quote.

Indentation — Green (ball point) circles should be drawn around the first word of all possible indentations. If the pupil has indented correctly, a green diagonal line should be drawn through the circle. Score: 1 point for each correctly indented paragraph.

TOTAL MECHANICS-RATIO SCORE

The total mechanics-ratio score should be recorded as per cent: (6/12 = 50%, 25/32 = 70%). The obtained per cent of mechanics accuracy should be recorded on Card 2 in the columns which will be specified by the Coordinating Center.

Spelling — Tally the number of spelling errors to the right of each line.

A word incorrectly capitalized should be recorded as a spelling error.

Subtract the number of errors from the total number of running words.

Score as number of words spelled correctly over total number of running words.

TOTAL SPELLING-RUNNING WORD COUNT

The total number of words correctly spelled should be recorded on Card 2 in those columns which will be specified by

the Coordinating Center.

The total number of running words should be recorded on Card 2 in those columns which will be specified by the Coordinating Center.

APPENDIX H

SELECTED ACHIEVEMENT TESTS

PHONETICALLY REGULAR WORDS ORAL READING TEST

CHILD'S NAME_____ DATE_____

SCHOOL_____ROOM_____CODE NUMBER_____

EXAMINER_____NUMBER OF WORDS READ CORRECTLY_____

1. nap	16. walk
2. pen	17. haul
3. hid	18. jaw
4. job	19. soil
5. rug	20. joy
6. shade	21. frown
7. drive	22. trout
8. joke	23. term
9. mule	24. curl
10. plain	25. birch
11. hay	26. rare
12. keen	27. star
13. least	28. porch
14. loan	29. smooth
15. show	30. shook

Directions: Have pupil read words from one copy while examiner makes another copy. Do not give pupil a second chance but accept immediate self-correction. Let every student try the whole first column. If he gets two words correct from word number six on, let him try the whole second column.

GATES WORD PRONUNCIATION TEST

Examiner's Copy

Directions: Have the child read the words out loud. Tell him you would like him to read some words for you. If he fails the first time, ask him to try the word again. Continue until ten consecutive words have been missed. As the words become difficult, special care should be taken to encourage the child. The score is one point for each word correctly pronounced on the first trial, one-half point for each word correctly pronounced on the second trial. (Note: 9 1/2 correct would be scored as 10.)

---

1. so	14. about	27. conductor
2. we	15. paper	28. brightness
3. as	16. blind	29. intelligent
4. go	17. window	30. construct
5. the	18. family	31. position
6. not	19. perhaps	32. profitable
7. how	20. plaster	33. irregular
8. may	21. passenger	34. schoolmaster
9. king	22. wander	35. lamentation
10. here	23. interest	36. community
11. grow	24. chocolate	37. satisfactory
12. late	25. dispute	38. illustrious
13. every	26. portion	39. superstition
		40. affectionate

CHILD'S NAME_____ TEST DATE_____

EXAMINER:_____ BIRTH DATE_____

AGE_____

Reading Test
A Linguistic Approach

Name _____

School _____

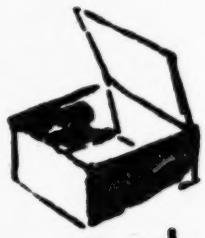
Date _____

Number Right		Total Score
Test 1	_____	9
Test 2	_____	9
Test 3	_____	9
(pages 3 and 4)		
Test 4	_____	9
(pages 5 and 6)		
Test 5	_____	12
Total	_____	48

Test 1

Sample

can
cans
cats

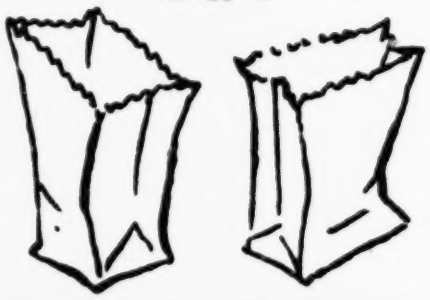


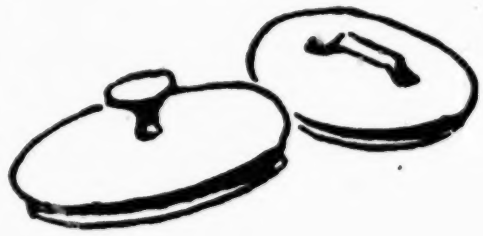
pot
mop
box

bits
bin
bats

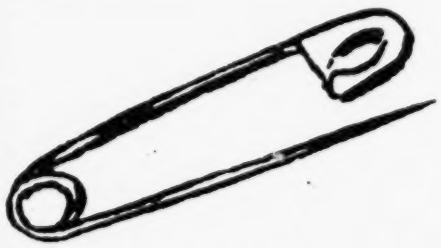
bug
bun
bus

bags
bits
bat





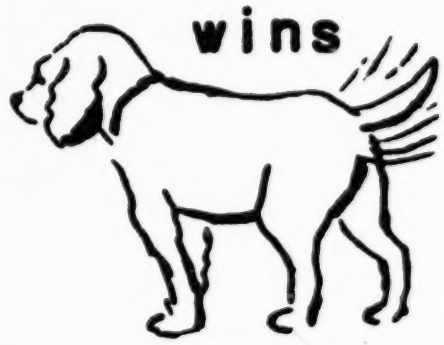
lad
lids
lid



lip
pig
pin

pig
pat
pan

wags
wigs
wins



gum
mug
guns

lid
lips
laps

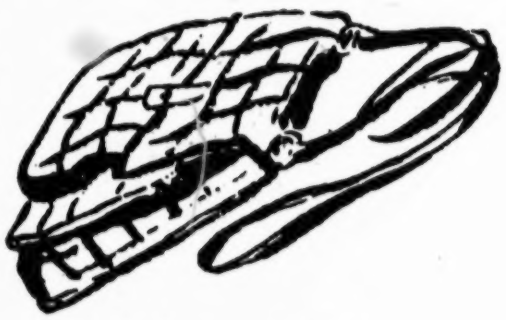
Gus
gun
guns

No. right _____

Sample

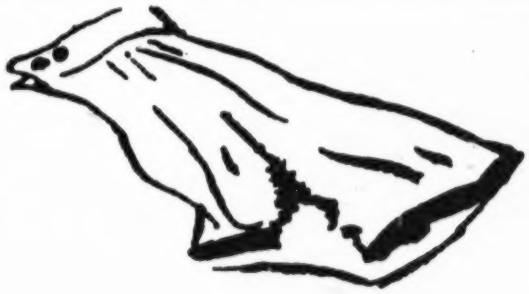
Test 2

a fat cat
a tan pig
a big bag



Nat's pan
Dan's bag
Rags on a mat

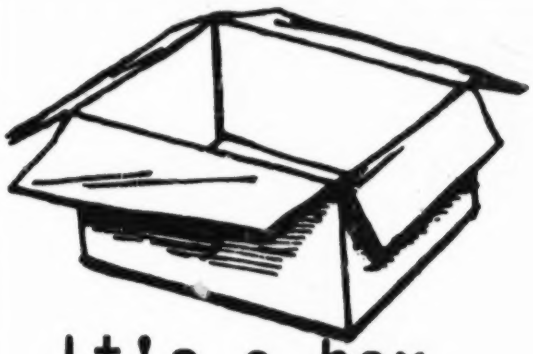
a rag mat
a bad nap
a bad fan



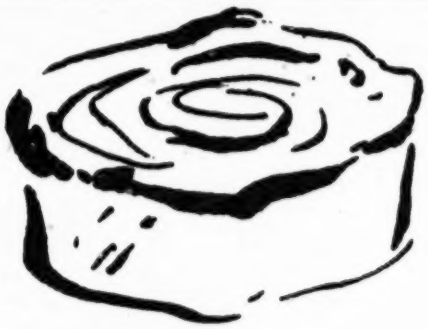
a big pin
a bad rip
Dan's lip

the tin cans
the big lid
the tan wig

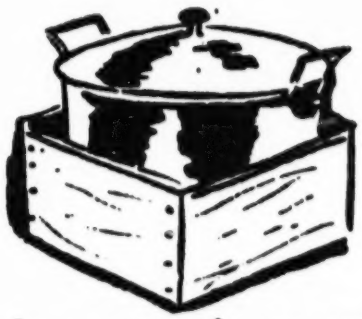
Jim did sit.
Tim can sit.
Dan did bat.



It's a box.
It's a mop.
It's a top.



a big bun
a tin hut
a mud rut



pots and pans
pot in a box
pits for pigs

a fox cub
a box top
a rag rug

No. right _____

Sample

Test 3

Dad had a map.
Dan tags Pam.
Rags wags and wags.

Dad had a map.
Dad can tap the fan.
Dad ran the van.

Dan tags Pam.
Dan had a bag.
Dan had a hat.

The cat is on the van.
The cat is on Dad's lap.
The hat is on the cat.

Dan's lip had a rip.
Tim's pin is tin.
Nat hid the lid.

No. right _____

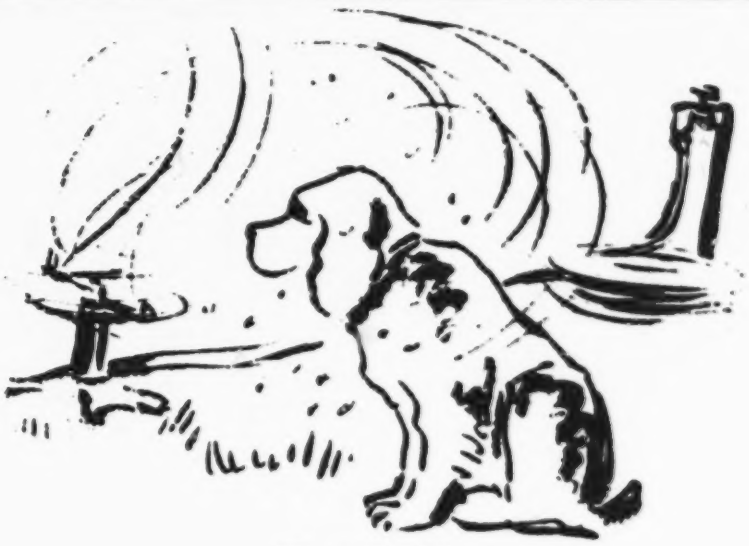
Six fat pigs can jig.
Six fat cats ran.
A pig sat in a pit.

Tim cut six buns.
Tim had a cap gun.
Tim had Nat's lid.

Pam's hat is in the van.
Bud's cap is in the mud.
Gus took Bud on the bus.

It's Tom with a top.
It's a box with a mop.
It's Mother with a pot.

The pet gets wet.
The man looks at a jet.
The pet is in bed.



No. right _____

Sample

Test 4

Mother has a tan wig.
Rags rips it. Mother can
not fix the wig.

1. Rags is _____.

   bad fun fat

2. The wig is _____.

   Dan's Pam's Mother's

A.

Nat has a tin pan.
Rags tips it. Nat can
not lap at it.

1. The pan is _____.

   Dan's Pam's Nat's

2. It's a _____ pan.

   tin pin win

B.

A big red fox runs into her den. She looks for her cub. The little cub is not in the den.

3. The big fox is _____.

hot sad wet

4. The cub is not _____.

cut mad big

C.

Jack's mother has a pet cat in a box. It's for Jack. He will have to be good to his pet. He gets a pan and a bed for it.

5. The cat will _____ on its bed.

jig beg nap

6. A pet has to be _____.

fed sick big

D. Dr. Dick said that Dan had to be in bed. He cannot get up. Mother let Rags get up on Dan's bed.

7. Dan is _____.

back well sick up

8. He can't go to _____.

sit school bed nap

9. Rags and Dan can have _____.

gum suds pills fun

Test 5

E. Mother had to chop ham for lunch.
Little bits of it fell from the dish.
Mother has to get a wet rag.

1. The ham was for _____.

   horses lunch school chicks

2. A rag can pick up the bits of _____.

   fish shell chops ham

3. Mother had so much ham that bits of it _____.

   fell rang hit hung

F. Pam's kitten jumped up on a bench in the kitchen. Dad's vest was on the bench. So was his jacket.

4. A kitchen is a _____.

   school shed room path

5. The vest and jacket belong to _____.

   Pam Jim Dad Ben

6. It will help if Pam _____ up Dad's vest and jacket.

   hangs things taps rings

G. Jim said, "Tim, I have to rush to get to school. Will you lend me your belt?" "I think it's under my blanket," said Tim. "Go up the ladder to my bunk bed."

7. Tim will lend his _____ to Jim.

pen cap belt blanket

8. On Tim's bed is a _____.

chest blanket doll kitten

9. Tim has the _____ bed.

top box fat red

H. After lunch, Sam played a game. Then Dad said, "It's time to go back to school." He made Sam stop playing and gave him a ride to school.

10. Sam likes _____.

kittens plums Tim games

11. Dad didn't want Sam to be _____.

little late fat ill

12. A _____ gets you to school fast.

late lunch ride belt